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# USSR Report

ENERGY

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28 December 1984

## USSR REPORT

## ENERGY

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## OIL AND GAS

### 1984 FIRST-QUARTER OIL INDUSTRY TARGET PERFORMANCE REPORTED

Moscow NEFTYANIK in Russian No 6, Jun 84 pp 1-2

[Unattributed lead article: "The Targets Assigned for 1984 Will be Met"]

[Text] A meeting of the board of the Ministry of Petroleum Industry was held on 15 April. Participants included B. Ye. Shcherbin, deputy chairman of the USSR Council of Ministers, officials from the CPSU Central Committee, USSR Gosplan, USSR People's Control Committee, the Ministry of Construction of Petroleum and Gas Industry Enterprises, Glavtyumenneftegaz, associations, oil and gas production administrations, and branch scientific research and design institutes.

A report entitled "Petroleum Industry Performance Results for the First Quarter of 1984 and Tasks of Workforces of Enterprises and Organizations Pertaining to Meeting Plan Targets and Socialist Pledges in Light of the Points and Conclusions Presented in the Speech by CPSU Central Committee General Secretary Comrade K. U. Chernenko, Chairman of the Presidium of the USSR Supreme Soviet, at the April (1984) CPSU Central Committee Plenum" was presented by Minister of Petroleum Industry N. A. Mal'tsev.

In the first 3 months of this year the enterprises of this industry produced 147.5 million tons of crude oil, including gas condensate, and 12.5 billion cubic meters of gas, including 72 million cubic meters above target.

Good results were achieved by the workforce of the Yuganskneft' Association, initiator of socialist competition in the industry. The workforces of the Tatneft', Bashneft', Kuybyshevneft', Grozneft' and a number of other associations showed a steady, stable performance. The Krasnoleninskneftegaz Association improved its performance.

Drilling organizations achieved high performance results. A total of 230,000 meters of above-target drilling was accomplished. Total drilling footage for the first three months was up 8 percent over the same period last year, while the figure was up 10.5 percent in Western Siberia.

Positive results were obtained in capital construction. With a capital spending target of 1.9 billion rubles, 2 billion rubles worth was actually accomplished, including 723 million rubles worth of construction and



installation work, which was 34 million rubles above target. Targets for the first three months pertaining to bringing oil wells into production -- new wells and reactivation of existing ones -- and conversion of wells over to artificial lift were overfulfilled for the industry as a whole.

Industrial enterprise workforces are successfully meeting adopted socialist pledges to accomplish a 0.5 percent above-target cost reduction; approximately 10 million rubles were saved in the first three months. Unfortunately the labor productivity increase target fell short by 0.2 percent.

The industry's crude oil and gas condensate production target was not met. This is due to a production shortfall by such associations as Surgutneftegaz, Nizhnevartovskneftegaz, Noyabr'skneftegaz, Azneft', and Mangyshlakneft'. The shortfall is connected primarily with poor utilization of the production well inventory, a poor level of organization of labor in the fields, in the oil production, well servicing and workover crews, fallbehind in construction of oil and gas field lines and facilities, and an inadequate level of oversight over their exploitation.

The harsh weather conditions in 1983, when well servicing and workover became much more difficult due to washout of oilfield roads, affected the state of affairs in Western Siberia to a certain degree.

The government gave oil workers considerable assistance: additional equipment and materials were allocated, and hiring limits were raised. The Ministry of Petroleum Industry dispatched to Western Siberia skilled workers from other oil producing regions to perform a number of highly important jobs. Making use of this aid, Western Siberian oil and gas producing enterprises accomplished in the first quarter of this year a large volume of work pertaining to bringing into production new and shut-in wells, repairing roads, and construction of oilfield facilities. Every effort should be made to increase the work pace in this area.

Comrade K. U. Chernenko's speech at the April CPSU Central Committee Plenum stressed with emphatic party demandingness the responsibility of management officials for unconditional fulfillment of state plans. Oil workers cannot permit themselves any slackness whatsoever in accomplishing this important economic and political task. Constant concern over the state of affairs, composure and a clear-cut focus on implementing formulated measures should not be forgotten by anybody for a single moment, and accountability for any and all deficiencies should be stricter than ever before in the past.

The minister's report devoted considerable attention to improvement of quality of construction and performance of scheduled preventive maintenance on oilfield lines. Normal operation of oilfield facilities is directly dependent on this. The people of the Western Siberian oil and gas production administrations should focus particular attention on this.

Oil workers are to produce almost 150 million tons of crude oil, including gas condensate, in the second quarter, while drillers are to increase footage by 1 million meters, boosting it to 7.5 million meters. The capital construction target prescribes construction and installation work totaling not less than

750 million rubles. It is important to increase, simultaneously with construction of production facilities, construction volume on housing and employee cultural and services facilities. Prompt completion of the full volume of housing construction is one of the main conditions for establishing stable workforces.

Particularly substantial targets in the area of capital construction and improvement of utilization of fixed productive assets face the oil workers of Western Siberia. Working in close contact with the construction people, they should meet and even exceed the prescribed work volumes. To achieve this is essential to ensure prompt and timely supply of equipment to construction sites, to provide operating personnel to facilities coming on-stream, etc.

The report drew the attention of officials of the Embanef't' and Soyuzneftegazpererabotka associations to the necessity of more aggressive efforts in the area of constructing lines and facilities in the Tengiz field in West Kazakhstan.

The minister placed particular stress on matters of design and estimate documentation. It is essential to complete at the earliest possible date the revision of capital construction estimates for 1984 in new prices and, in addition, to issue on schedule, by 1 July of this year, technical solutions and design-estimate documentation in new prices for the entire volume of 1985 construction.

Guided by the decisions of the April (1984) CPSU Central Committee Plenum, we must raise the level of organizational and political indoctrination work at all levels in this industry -- from basic workforces, to and including ministry administrative offices -- and we must do everything to ensure unconditional achievement of plan targets and socialist pledges for 1984 pertaining to production and delivery of crude oil, and secure a 1 percent labor productivity increase above target.

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## OIL AND GAS

### 1984 PROGRESS IN AZERBAIJAN OIL, GAS EXTRACTION SUMMARIZED

Baku AZERBAYDZHANSKOYE NEFTYANOYE KHOZYAYSTVO in Russian No 9, Sep 84 pp 1-2

[Article: "Higher Rate of Development of Petroleum and Gas Extracting Industry"]

[Text] Workers of oil and gas industry are meeting their professional holiday in an atmosphere of high political morale and enthusiastic work. Implementing the decisions of the 26th CPSU Congress and of the February and April (1984) CPSU Central Committee plenums, and the premises and aims stated in speeches by CPSU Central Committee general secretary, chairman of the Presidium of the USSR Supreme Soviet, Comrade K. U. Chernenko, the Soviet people are actively fighting to fulfill and surpass the quotas for 1984 and for the five-year plan as a whole.

Azerbaijan is widely known today as a republic of predominantly offshore oil and gas extraction. Laborers of the Kasporneftegazprom All-Union Production Association are extracting over 70.0 percent of the republic's oil and the bulk (90.0 percent) of its gas. Offshore oil and gas deposits are being developed, equipped and operated on the basis of the best equipment and procedures.

The proportion of Azerbaijan oil and gas in the country as a whole has naturally decreased significantly with development of new oil and gas bearing regions. But Azerbaijan's oil and gas sector continues to play an important role in the republic's national economy and in the structure of its fuel and energy complex.

Defining the significance of petroleum industry as one of the leading sectors of the economy, the 30th Congress of the Azerbaijan Communist Party posed the task of not only stabilizing oil extraction but also increasing it through wide introduction of progressive methods of intensifying extraction, and development of new deposits at sea and on land.

It is a pleasure to know today that oil and gas producers are making a definite contribution to the truly outstanding successes of Soviet Azerbaijan. They are developing over 50 deposits in complex conditions to various depths down to Mesozoic deposits, concealed beneath as much as 200 m of Caspian waters.

The new deposits of Kalamaddin and Muradkhaily were explored and put into operation, and the Tarsdallyar and Zardob deposits were discovered, attesting to the real prospects of developing oil extraction on land.

Offshore oilmen discovered the deposits imeni 28 April', Alyaty-more and imeni 8 Mart, and a gas condensate deposit in horizon VIII of the productive bed of Bulla-more. Exploratory drilling has begun in the Kaverochkin area.

In the intervening period 175 new wells progressed from drilling to exploitation, and 173 dead wells were reactivated. Over 28,000 geological and technical measures were implemented, as were a large number of measures to stimulate the deposits and treat the bottom-hole zone.

In the republic as a whole, the gas extraction plan is being fulfilled at a sustained rate, one surpassing the control figures of the five-year plan. In 8 months of 1984 217.0 million m<sup>3</sup> of gas were extracted in excess of the plan. In 8 months of 1984 the plan was surpassed by 35,000 tons of oil. In the corresponding period of last year oil extraction increased by 14,000 tons, while the extraction plan for gas was exceeded by 200 million m<sup>3</sup>. Since the beginning of the year the Kasporneftegazprom All-Union Production Association exceeded its product sales plan by 7.0 million rubles. Labor productivity surpassed the plan by 1.0 percent in the industry.

These successes and accomplishments are associated with the hard work of all labor collectives, in which the production leaders, the initiators and pursuers of new ideas and of valuable initiatives in socialist competition play the main role. The great creative labor of the best collectives and production innovators has received due recognition and assessment.

The collectives of the Karadag...it' NGDU [Petroleum and Gas Extraction Administration] and the Azerbaijan Gas Refinery earned the Perpetual Red Banner of the Azerbaijan Communist Party Central Committee, the Azerbaijan SSR Council of Ministers, the Azerbaijan Trade Union Council and the republic's Komsomol Central Committee.

The Association imeni XXII s"yezd KPSS, the Offshore GRK [not further identified], the Azerbaijan Gas Refinery and the Azneftestroy Trust were among the winners of this year's all-union socialist competition in the oil and gas sectors.

The honorary title of best brigade in the sector ministry was won by collectives led by foremen Akif Amanov (Ali-Bayramli UBR [Drilling Operations Administration]), Surid Dzhafer-zade (Neftyanyye Kamni UBR), Sarkhosh Mamedov (Kyursanginskoye UBR), Eduard Aslanov (Bulla URB), Dashdamir Abdurakhmanov (Bukhta Il'icha URB), Rasim Ragimov (Kirovneft' NGDU), Adil Mamedov (Production Association imeni XXII S"yezd KPSS), Taptyg Shiraliyev (Ordzhonikidzeneft' NGDU), Migdat Tairbekov (NGDU imeni Serebrovskiy) and others.

The best labor collectives of Azerbaijan oilmen and gas producers enthusiastically joined the socialist competition dedicated to the jubilee of the Soviet people's victory in the Great Patriotic War and the 50th anniversary of the Stakhanov Movement. The following slogans became their battle program: "Forty Shock Work Weeks for the 40th Anniversary of the Great Victory," "Surpass the Extraction Quota Every Day," "Let No One Fall Behind in His Work." Many brigade collectives pledged to fulfill the quotas of the five-year plan by this noteworthy date.

In July 1984 the drilling brigades led by foreman D. Abdurakhmanov and G. Isayev, which were drilling wells together with the 28 April' MPS No 2 [possibly offshore petroleum gathering point], fulfilled their annual drilling plans and attained a drilling rate of 800 meters per standard month, which is twice as fast as the planned rate.

In addition to the successes and accomplishments, we should note that the republic's petroleum and gas extracting industry is completing this period of the current five-year plan with a shortfall in oil extraction. In 8 months of 1984 the Azneft' Production Association was left owing 79,000 tons of oil, and its drilling fell short by 17,000 m. The Kasporneftegazprom All-Union Production Association was 7,000 m short of its drilling plan. This is evidence of insufficiently purposeful and energetic work aimed at utilizing the available scientific-technical potential, and of weakness in the effort to solve the complex problems of modern oil production. Available reserves for maintaining the level of oil extraction are not being utilized fully yet, and everything necessary has not yet been done to preserve the well pool and to utilize new methods of raising the oil output of the beds.

Many enterprises, brigades and shops are unable to handle their quotas for production volume, raising labor productivity and reducing cost. It is the duty of oil and gas producers, builders, drillers, transportation workers and machine builders to work at peak effort to fulfill the implemented measures and to utilize all reserves competently and sensibly.

An extensive complex of specific objectives which, when attained, should promote further improvement of the economy, was clearly determined at the June Plenum of the republic's Communist Party Central Committee, which discussed measures for implementation of the CPSU Central Committee Decree "On Activities of the Azerbaijan Party Organizations Associated With Fulfilling the CPSU Central Committee, USSR Council of Ministers and AUCCTU Decree "On Intensifying the Work to Reinforce Socialist Labor Discipline."

Fully supporting the adopted measures for reinforcing production and labor discipline and raising the role of labor collectives, the oilmen and gas producers will apply all effort to see that a fundamental turning point is achieved in the oil extracting sector, they will do everything required of them to multiply the glory of Azerbaijan oilmen, and they will make their worthy contribution to strengthening the motherland's economic might.

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## OIL AND GAS

### AKTYUBINSKNEFT' ASSOCIATION PERFORMANCE FIGURES, 1984 TARGETS

Moscow NEFTYANIK in Russian No 6, Jun 84 pp 9-10

[Article by N. Misyaurov, deputy general manager of the Aktyubinskneft' Production Association: "Crude Oil Production Will Double"]

[Text] The workforce of the Aktyubinskneft' Production Association, implementing the decisions of the 26th CPSU Congress and the subsequent CPSU Central Committee plenums, successfully met the plan targets and socialist pledges for 1983. The crude oil production target was met by 101.1 percent, above-target production totaled 4,700 tons of crude with pledges of 4,000 tons, and above-target product sales totaled 552,000 rubles. Labor productivity in oil production rose by 2.4 percent over 1982, and labor productivity growth targets were also met in drilling, transportation, and construction. Savings in actual expenditures on production of crude totaled 1,687,000 rubles. An increase in the drilling rate and a reduction in rig-building time made it possible to reduce the cost per meter drilled, at the same time reducing the overall cost of well construction by 373,000 rubles below estimate.

Strengthening the material and technological foundation of drilling organizations and implementation of a number of organizational-technical measures enabled the association to secure a high drilling volume growth rate. The volume was 17,000 meters in 1981, 85,500 in 1982, and 129,600 meters in 1983. The largest contribution was made by the workforce of the Oktyabr'skoye Drilling Operations Administration, which last year twice won the All-Union Socialist Competition among the enterprises of Minnefteprom [Ministry of Petroleum Industry]. The Oktyabr'skoye UBR [Drilling Operations Administration] was established at the end of the first year of the current five-year plan and has rapidly grown into a large, vanguard enterprise of our association.

The drilling crews [brigady] of the vanguard administration are engaged in socialist competition to achieve maximum footage drilled per drilling crew per year. The crew led by foreman V. V. Benner was the competition initiator. Footage targets were specified on the basis of the attained volume in 1982, taking into account increase in drilling rates, dissemination of advanced know-how, improvement in drilling organization and technology.



Four of the 10 drilling crews achieved their targeted footage marks last year -- the crews led by foremen A. I. Lopukhov and S. V. Zaikin, which drilled 7,728 and 8,249 meters respectively in the Zhanazhol field, and the crews of foremen S. A. Kuznetsov and A. G. Udzhukhu, which drilled 19,730 and 17,470 meters respectively in the Kenkiyak field, with a targeted 17,000 meters. Success was achieved by improving the drilling process -- selection and utilization of an efficient range of drill bits, which made it possible to drill 71.8 meters per bit and to achieve 20,730 rubles in savings, improving the drilling mud cleaning [shale shaker-desilter-desander-degasser] system, and employing efficient drilling practices.

Labor activeness was fostered by extensive socialist competition among drilling crews, study and adoption of advanced know-how. Two schools of advanced know-how were held for workers, engineers, technicians, and foremen last year, based on the vanguard crews of the Oktyabrskoye UB<sup>7</sup> headed by S. V. Zaikin and V. V. Sviridov, on the following topics: "Ways to increase drilling rates and improve work quality in drilling wells in the Zhanazhol field," and "Adoption of turbodrilling in the Zhanazhol field." In addition, 10 conferences were held on improving organization of drilling operations.

Substantial performance results were achieved by the workforce of the Kenkiyakneft' NGDU [Oil and Gas Production Administration]. Last year they brought 99 new wells into production, as compared with the targeted 77, and they brought 13 shut-in wells back into production, with a targeted 12. As a result of these measures, crude oil production volume here rose 20.9 percent above last year's figure. Achievement of the crude-oil production target was helped by optimization of artificial-lift well operations, well-stimulation treatments, and employment of screen liners. For 12 years now the Kenkiyakneft' NGDU has been injecting steam into the oil zone on an experimental full-scale basis, for the purpose of boosting oil recovery, and this is producing appreciable results. In 1983 alone additional production of crude with this enhanced-recovery method exceeded 200,000 tons. Vanguard crews in the Kenkiyakneft' NGDU include foreman B. Kanbayev's production crew, foreman M. Alpanov's well servicing crew, which achieved its year's target by 1 November 1983, and foreman G. S. Shumatov's well workover crew.

The volume of funds allocated for financing scientific research activities increased. A comprehensive program for testing and bringing wells into production in the Zhanazhol field was drawn up in the association last year with the participation of lead institutes of Minnefteprom and institutes of other ministries, specifying measures to protect lines and equipment against hydrogen sulfide corrosion. Scientifically substantiated procedures for casing and cementing wells in this field have been formulated, process procedures for heat treating welds and box-and-pin facing have been adopted, as well as drilling mud treatment procedures and other operations. Economic effectiveness from their adoption totaled 1,519,000 rubles.

In addition to scientific research organizations, a substantial contribution toward improving production is being made by the association's efficiency innovators. Over the course of the year they submitted 100 efficiency innovation suggestions, and 80 were adopted, generating an overall savings of

250,000 rubles. N. N. Lavrinenko, V. Ye. Bushuyev, Ye. N. Morozov, and L. N. Perevezentsev are the top efficiency innovators.

Work continued on further expansion and improvement of the brigade [crew] form of organization of labor. Fifty-nine brigades were formed at enterprises. Thus the total number of workers in brigades increased to 64.1 percent of the total blue-collar workforce. In half the brigades wages are figured according to a unified work order [yedinyy naryad].

In the driver brigades of the Oktyabrskoye Service Transport Administration, wage bonuses for achievement of group, brigade indices, including freight volume and vehicle utilization factor were adopted, alongside worker wage bonuses for individual performance results.

The workforces of the enterprises of the Aktyubinskneft' Association analyzed their operations state of affairs and designated specific measures to boost the effectiveness of the brigade form of organization of labor.

The association's successful performance depends in large measure on stability of the workforces of enterprises, shops, sections, and brigades, and maintaining a stable workforce of skilled workers and specialists. The construction organizations of Mintyazhstroy [Ministry of Construction of Heavy Industry Enterprises] were supposed to build 30,000 square meters of housing for the association's oil workers in the town of Oktyabrsk in the period 1982-1983. In actual fact they erected only two buildings totaling 7,900 square meters. It is true that the association, using its own manpower and resources, built and turned over to occupancy prefab dormitories accommodating 2,500 persons. Nevertheless this does not resolve the housing problem. The rate of labor turnover at our enterprises remains high.

This year the workers of the Aktyubinskneft' Association are faced with large tasks, paramount among which are bringing the Zhanazhol field into experimental full-scale production on an accelerated pace and more than doubling crude oil production volume. The association's socialist pledges specify above-target production of 5,000 tons of crude, above-target sales totaling 150,000 rubles, savings of 0.7 million kilowatt-hours of electricity, 20 tons of metal, 8.4 tons of gasoline, 18 tons of diesel fuel, etc. Responding with deeds to the decisions of the December (1983) and subsequent CPSU Central Committee plenums, the workforces of our enterprises pledged to boost labor productivity by 1 percent above target. Specific ways to improve production efficiency have been spelled out in order to meet adopted pledges.

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## OIL AND GAS

### OILFIELD FIGURES FOR SARATOVNEFTEGAZ ASSOCIATION

Moscow NEFTYANIK in Russian No 6, Jun 84 p 3

[Article, published under the heading "Socialist Competition," by G. S. Luzyanin, general manager of the Saratovneftegaz Association: "The System of Organization of Socialist Competition in the Saratovneftegaz Production Association Is Directed Toward a Common End Result"]

[Excerpts] A correct directional thrust to competition among the workforces of drilling and rig-building enterprises made it possible to drill 110,500 meters more in 1983 than in 1982 for the association as a whole; drilling increase in Western Siberia totaled 87,000 meters, about 9,000 meters in Saratov Oblast, while drilling volume increased by 60 percent in West Kazakhstan. The target for increase in oil and gas reserves and turning over completed wells to the client, as well as targeted drilling rates for both purposes were achieved. Footage per drilling crew [brigada] was as follows: 61,600 meters in Western Siberia (an 11.2 percent increase over 1982); 5,196 meters in Saratov Oblast (a 3.2 percent growth); 4,698 meters in West Kazakhstan (11.8 percent growth).

Drilling volume increased substantially in the 10th Five-Year Plan. This made it possible to ensure stable oil production in Saratov Oblast and to establish sufficient crude production capacity in Western Siberia. Growth in oil and gas reserves along the Volga in Saratov Oblast became more stable. Economic effect from improving indices tripled, while economic effectiveness per ruble of production outlays doubled.

Hard, purposeful work to achieve oil and gas reserves growth targets as well as intensification of oilfield development and optimization of work with the well inventory made it possible, instead of the drop specified by the draft exploitation plans, to secure stable production and produce, over the three years, above and beyond the five-year plan target, 135,000 tons of crude, 113 million cubic meters of natural gas, while labor productivity growth was 4.3 percent. Field processing of crude and custody transfer of crude oil certified to the first quality group rose to 94.7 percent in 1983. For all three drilling areas (Saratov Oblast, Western Siberia, and West Kazakhstan), a total of 2,378,000 meters was drilled in the three years (138,400 meters more than prescribed by the five-year target).

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## OIL AND GAS

### BORISLAVNEFTEGAZ OILFIELD EXPLOITATION LAB ACTIVITIES

Moscow NEFTYANIK in Russian No 6, Jun 84 p 4

[Article by L. Shikh and O. Motovilyak, Borislavneftegaz Oil and Gas Production Administration: "Meaningful Competition Is a Guarantee of Creative Activity by Engineer and Technician Personnel"]

[Excerpts] The oilfield development laboratory of the Borislavneftegaz Oil and Gas Production Administration was organized at the beginning of the 10th Five-Year Plan. Its small, smoothly-functioning work team (six engineers and technicians) is achieving decent results in their work and is making a definite contribution toward accomplishing the production schedule and meeting enterprise socialist pledges.

Daily routine work -- making analytical calculations of oilfield exploitation processes, preparation of various graphic materials, measures to improve exploitation of existing pools and operation of individual wells, preparation of plans and schedules for test operation of wildcat and exploration wells, etc -- does not keep the laboratory people, in spite of frequent official travel, from taking active part in socialist competition and in enterprise volunteer activities.

Socialist competition results are totaled up according to seven rigorously-determined indices. The first and one of the principal indices in competition between production subdivisions, departments and laboratories is mandatory preparation of engineering studies. In the last three years 15 technical engineering studies were prepared, including five in 1983. One of them, for example, deals with scientific validation of efficient siting of lead wells on a menilite reservoir in the Novoskhodnitskoye field. Completion of this project will make it possible in the near future to bring high-output wells into production. Several studies deal with adoption of new methods of squeezing oil from producing zones in the old fields of the Borislavskiy oil and gas region, which is in the fourth, final stage of exploitation. One such study, completed in 1983, deals with increasing the effectiveness of hot-steam injection into the Urichskaya pool of the Skhodnitskoye field, an operation which is being conducted here in extremely adverse physical-geologic and operational conditions.

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## OIL AND GAS

### OIL INDUSTRY SOCIALIST COMPETITION WINNERS CONFERENCE

Moscow NEFTYANIK in Russian No 6, Jun 84 pp 5-6

[Article, published under the heading "Our Report," by S. Folumenov: "Vanguard Workers Suggest"]

[Text] Oil workers are striving with selfless labor to accomplish the important tasks assigned to the petroleum industry by the 26th CPSU Congress. This is vividly attested by the tough socialist pledges adopted by workforces, initiatives and undertakings aimed at ahead-of-schedule accomplishment of the targets of the 11th Five-Year Plan.

Successful work performance is being fostered by socialist competition in progress at enterprises and organizations of this industry, competition to improve work efficiency and quality on the part of every workforce and at every work station, initiated by the workers of the Yuganskneftegaz Association. For many years now they have been achieving high, stable performance results and are rightfully retaining the challenge Red Banner of the CPSU Central Committee, USSR Council of Ministers, All-Union Central Trade Union Council, and All-Union Komsomol Central Committee.

The workforce of the Mirnenskoye Drilling Operations Administration came forth with a valuable patriotic initiative, pledging to complete the five-year plan target pertaining to well construction in Western Siberia by the 40th anniversary of the victory of the Soviet people in the Great Patriotic War. In 1983 this workforce accomplished a substantially increased plan target (740,000 meters) ahead of schedule, by 5 November 1983, without increasing the number of drilling crews [brigady].

The competition to achieve the greatest footage per drilling crew was led by the workforce of Surgut Drilling Operations Administration No 2. Working under the slogan "Not by numbers but ability," it resolved, just as last year, to drill 100,000 meters per crew. The administration's drilling crews are filled with resolve to boost labor productivity by 1.5 percent and to reduce drilling cost by 1 percent.

The brigade contract has experienced further development in the construction organizations of this industry. Last year 383 brigades operated under this method, or 20 percent of the total. Cost of construction work was reduced by

3.25 million rubles through adoption of the collective contract. Labor productivity in cost-accountable brigades is 8-15 percent higher than in those which have not changed over to cost accountability.

This industry's construction workers are faced with tough tasks in the fourth year of the five-year plan. They are to accomplish construction work in the amount of more than 1 billion rubles with their own manpower and resources. Thirty-three percent of the total volume of construction work is to be done under the brigade contract method. In Western Siberia alone construction workers are to build field lines and facilities for and bring into production more than 6,000 oil wells and 1,600 injection wells, and to lay approximately 2,500 kilometers of pipeline.

Last year there was continued growth of the movement under the slogan "Stress maximum production of crude from each well," a movement which involved the participation of 445 shops, 1,287 oil and gas production crews, and 2,358 well servicing crews. The shops and crews of the leading job categories did a particularly good job in the Yuganskneftegaz, Nizhnevolzhskheft', Ukrneft', Tatneft', Bashneft', and Kuybyshevneft' associations.

A 1983 USSR State Prize for outstanding labor accomplishments, initiative in developing socialist competition, high production efficiency and work quality was awarded to oil and gas production foremen F. A. Krylov of the Surgutneftegaz Association and D. Ye. Kostyunin of the Tatneft' Association, and well workover crew foreman A. M. Atanov of the Kuybyshevneft' Association.

In short, the winners of the All-Union Socialist Competition for 1983, who traveled to Moscow for a conference organized by Minnefteprom [Ministry of Petroleum Industry], had plenty to report. The conferees included distinguished individuals -- oil and gas production shop superintendents and foremen, foremen of well servicing and workover crews, drilling and rig-building crews, structure drilling crews, well testing crews, and construction crews.

The conferees shared their work experience, told about adopted pledges and prospects for 1984 and about what is impeding them from working at full output. The following suggestions were presented by vanguard workers in their statements at the conference.

O. V. Puzanov -- oil and gas production shop superintendent, Al'met'yevneft' NGDU [Oil and Gas Production Administration]: "In recent years cluster drilling has been extensively practiced. There is no need to add that this produces considerable savings. As experience indicates, however, slant-drilled wells present difficulties in sucker-rod pumping. Breakdowns and complications occur during well-servicing operations due to damage to tubing strings. Improved submersible pumps must be adopted in a more vigorous manner."

D. M. Nurutdinov -- Hero of Socialist Labor, USSR State Prize recipient, Al'met'yevskoye UBR [Drilling Operations Administration] drilling rig foreman: "In recent years drillers in the Tatar ASSR have been hindered from successful drilling operations by serious deficiencies in rig building and performance of

geophysical work. The fact that the rig-building crews are poorly provided with equipment (earth augers, portable derricks) prevents them from completing their job promptly for the drilling crews to come in. More than 60 days of drilling delay occurred in our administration alone, for the most part through their fault. Idle time by completed wells waiting for the rig to be taken down totaled 130 days."

G. M. Chistyakov -- drilling rig foreman, Birskeye UBR, Bashneft' Association, who is working on a "duty-tour" [so many days on, followed by so many days off] basis for the Surgutneftegaz Association: "Uninterrupted work by the crew is hindered by interruptions in supply of the requisite array of drill bits, a shortage of turbodrills and the needed chemical reagents. During the well completion process we are faced with a shortage of casing heads, tubing heads, and Christmas trees. We would also like to see the bunk cars and canteen cars for the drilling crews made more comfortable and easy to move."

A. A. Vikhlyantsev -- oil production foreman, Korobkovskoye NGDU, Nizhnevolzhskneft' Association: "Our crew is meeting its adopted counterplan target for 1984 ahead of schedule: it calls for producing 10,000 tons of crude above target, increasing labor productivity by 2.9 percent and reducing cost by 0.7 percent above target. But the crew is being impeded from working at full output by annoying problems which are almost impossible to correct on the spot. These involve first and foremost supplying fuel to oilfield vehicles or performing well testing and servicing operations, as well as routine transportation needs. Sometimes due to a lack of gasoline we are unable to bring a well into production on schedule, and it sits idle days on end. By saving the 20-30 liters of gasoline required to start up a well, we lose 50-60 tons of crude. In my opinion the oil production people should not limit gasoline for trucks servicing wells."

V. G. Kolesnikov -- drilling rig foreman, Pokachevskoye UBR, Nizhnevartovskneftegaz Association: "Last year my crew reached for the first time the 80,000 mark in annual drilling footage in wells 2,500 meters deep. In December we shall complete the five-year plan with 225,000 meters, accomplishing our upgraded pledge. The crew could have been more successful, however, if we had been able to end once and for all idle time through the fault of those who are supposed to provide us with supplies and services. Productive time last year ran 95.5 percent. On some wells we achieved 100 percent productive time, but nevertheless idle time occurs, especially through the fault of the geophysicists."

"We are also forced to stand around idle through the fault of the cementing crews. We are hindered in our work by a shortage of turbodrills, drill bits, rubber products, bushings, pump valves and plungers."

A. T. Volkov -- oil and gas production shop superintendent, Arlanneft' NGDU, Bashneft' Association: "I feel that it is essential to establish oilfield engineer and technician employment figures on the basis of number of wells serviced. We need a scientifically substantiated standard for each shop for size of workforce, payroll, and material incentives system based on number of wells serviced, as well as specialized equipment."

V. L. Sidorov -- drilling rig foreman, Surgut UBR No 2: "In order further to improve oil drilling technology and to increase rates of directional drilling, we must more boldly utilize existing reserve potential and reveal new potential, in particular:

provide all drilling rigs with drilling parameters monitoring stations capable of recording not only all drilling condition parameters but also drilling mud parameters;

achieve complete changeover to casing strings with buttress and OTTM threads;

adopt centrifuges as a third stage in the mud system desilter-desander sequence."

Addressing the conference, Minister of Petroleum Industry N. A. Mal'tsev called upon the vanguard workers, upon arriving back home, to make every effort to expand socialist competition and to achieve unconditional achievement of plan targets for the fourth year of the 11th Five-Year Plan.

In conclusion the conferees adopted an appeal to all workers and work forces of Minnefteprom to expand socialist competition for successful fulfillment and overfulfillment of plan targets and pledges for 1984 and the five-year plan as a whole.

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## OIL AND GAS

### PLANS REVEALED TO BUILD MORE GAS STATIONS IN RSFSR

Moscow NEFTYANIK in Russian No 6, Jun 84 pp 7-9

[Article, published under the heading "Implementing CPSU Decisions," by V. S. Tarakanov, chairman, RSFSR State Committee for the Supply of Petroleum Products: "Current Problems and Tasks of Refined Products Supply"]

[Text] Last year the party and government drew up and adopted a number of decrees on key matters pertaining to development of the nation's economy. They include the CPSU Central Committee and USSR Council of Ministers decree entitled "On Increasing Efficiency of Utilization of Motor Transport Resources in the Nation's Economy, Stepping up the Campaign Against Exaggerated Figures in Motor Transport Hauling, and Safeguarding Fuels and Lubricants."

The editors asked V. S. Tarakanov, chairman of the RSFSR State Committee for the Supply of Petroleum Products, to discuss the current state of affairs in the refined products supply system.

This decree is one more indication of the exceptional importance which the party and government attach to transportation and the branches of industry which support transport operations. In our country transportation performs not only an economic but also an important sociopolitical function.

A substantial portion of the able-bodied population is employed today in transportation; transportation consumes almost 13 percent of all types of fuel and energy resources. In the current five-year plan an additional more than 2 million rubles in capital spending is specified for development of this industry, and freight traffic by all modes of transportation is targeted to rise by 22 percent.

In recent years motor transport, which has become a most important component of the unified transportation system, has been experiencing the most extensive development. Presently more than 82 percent of all economy-classified freight hauls in the RSFSR are handled by motor transport. New, modern trucks are joining the truck fleet, truck quality is improving, and the trucking facilities base is growing stronger.

At the same time the transportation industry is not fully meeting its assigned tasks and does not always function smoothly. Organization of transport operations record keeping, securement of efficient, economical consumption of fuels and lubricants, and setting of standards for motor fuel consumption are inadequate, which promotes the creation of conditions for falsely claiming higher haulage figures and leads to loss and pilferage of fuel and lubricants, which in the final analysis does great material and moral detriment to society. Inspections indicate that a substantial portion of the fuel allocated to state motor transport is being sold to the owners of private cars.

This situation is due in considerable measure to deficiencies in the refined products supply system. Gas stations are still few and far between. There are still some towns, urban-type communities, and many rural rayons without any gas stations whatsoever. Most individuals residing in rural areas fill their cars with gasoline belonging to kolkhozes, sovkhozes, and other state and public enterprises and organizations. Persons owning pleasure craft have a hard time obtaining fuel and lubricants.

The rules and regulations governing sale of petroleum products are violated at many gas stations, and there are occurring instances of theft, abuses, and rudeness to customers. These violations are frequently viewed as trivial, and the guilty parties go unpunished.

These violations have been occurring for quite some time; the Committee has adopted various decisions in order to end these abuses, but unfortunately these decisions are not always implemented, due to slackening of discipline and demandingness, a lack of adequate oversight, and an irresponsible attitude by certain officials of administrations and bulk plant managers toward matters pertaining to expanding the network of gas stations, achieving economy and savings in refined products and ensuring that they are safeguarded.

Considering the ever increasing role of motor transport in the nation's economy and attaching particular importance to increasing the efficiency of its utilization, elimination of false performance claims, and ensuring the safeguarding and economical consumption of fuels and lubricants, the CPSU Central Committee and USSR Council of Ministers have presented in this decree an extensive program of action and have defined the large-scale tasks directly facing the Committee. These include, first and foremost, the task of establishing a network of special gas stations to sell fuel and lubricants to the owners of private cars for cash. Such a system is to be on-line by 1 July 1984 in the capitals of autonomous republics, kray and oblast administrative centers, and other large cities in the RSFSR, and along main highways by the end of 1986. We must establish in our country on this extremely tight timetable a network of not fewer than 3,000 of these special gas stations. Of these gas stations, 1,577 (or 53.4 percent) are to be established in the RSFSR. Broken down year by year, the target appears as follows: 1983 -- 331; 1984 -- 420; 1985 -- 415; 1986 -- 411 gas stations.

An important task has been assigned to the RSFSR State Committee for the Supply of Petroleum Products and Rospotrebsoyuz -- to put an end to the bad practice of private car owners residing in rural areas using for their own



needs fuel and lubricants belonging to kolkhozes and sovkhoses as well as other state and public enterprises and organizations. To accomplish this it is necessary to establish an extensive network of gas stations in rural locations in the period 1984-1987. The Committee has responsibility for organizing the sale of automotive fuel to the public in 740 rural rayon administrative centers situated on highways, while Rosputretsyuz will handle the establishment of gas stations in all other localities. In spite of this division of tasks, however, the job should be done in concert, in a coordinated manner, giving one another whatever assistance is needed.

The system of supplying petroleum products through a network of gas stations is of rather recent date in this country. While the first bulk plant and refined products transport facilities in Russia appeared at the end of the last century, the first gas station was not built until 1928. Until 1959 all gas stations were ministry-run, and it was not until the beginning of the 1960's, after transfer of most gas stations to petroleum marketing organizations, that the first steps were taken to establish a network of public-access gas stations.

A great deal has been accomplished in recent years. More than 4,000 service stations are presently in operation in the RSFSR, through which more than 24 million tons of petroleum products are marketed. This is insufficient to meet today's needs, however. In the last 15 years the fleet of state-owned and privately-owned motor vehicles in the RSFSR has almost quintupled, while the total number of gas stations has increased by only a factor of 2.4. As a consequence of the lag in rate of growth of the gas station network, there has developed an obvious shortage of such facilities. The existing situation is aggravated by the fact that gas stations are distributed very unevenly across the territory of the RSFSR, and the density of distribution between individual regions varies across a broad range.

We should note that while privately-owned motor vehicles represent only a small fraction of consumed petroleum products as compared with state-owned vehicles, privately-owned vehicles comprise approximately 90 percent of the total number of motor vehicles. In view of the growth rate of privately-owned vehicles and the specific features of servicing these vehicles, there is no question about the advisability of establishing for these purposes a network of special gas stations. The main difficulty in establishing such a network lies in the fact that the traditional types of gas stations may prove to be excessively lightly work-loaded in handling only this group, especially in the winter. In these conditions it would be expedient to make extensive use of small service stations and bare-essential dispensing unit (konteynernyy; "container") stations. Employment of such stations will make it possible sharply to accelerate construction of a network of specialized filling stations and to organize servicing of privately-owned cars directly where they are to be found (on paid-space parking lots, near garages and motels). On highways such stations can be utilized as satellite service stations together with already existing highway service stations.

Centralized series production of such stations has not yet been set up. This year the Committee will be able to allocate to the administrations only 50 of these service stations. There are many unresolved matters regarding obtaining

funds for the requisite materials and components equipment. But time is not standing still. These matters can and must be resolved locally, by looking for possibilities of manufacturing "container" filling stations at industrial enterprises located within the jurisdictions of the branch administrations and setting up production with local manpower and resources. Some administrations do have the experience.

The matter of establishing specialized service stations in the rural areas, in which more than 1.5 million privately-owned cars and more than 4.5 million other motorized vehicles are presently concentrated, requires the most serious attention. We are authorized to build service stations in rural localities beyond the state capital spending allocation by obtaining Gosbank loan credit. Credit is issued, however, only if the requisite amount of design-estimate documentation and appropriate economic effectiveness calculations are presented.

The cost of building one "container" or small filling station, including erection and installation, can be in the order of 40,000 rubles. With the trade discount, which is the source of loan repayment, 14-15 thousand rubles, the cost of building such a filling station will be repaid in 3 years. All that is needed is commitment on the part of administration officials and personal initiative in working with local Gosbank offices, party and soviet agencies.

Construction of gas stations in rural areas should not be postponed, for lost time cannot be made up. The Committee will rigorously oversee this area of activity and hold the remiss strictly to account.

Certain work has been accomplished in the short period since the CPSU Central Committee and USSR Council of Ministers decree was made public.

The Committee met its assigned targets as a whole in 1983. Sale of petroleum products to owners of privately-owned vehicles for cash has been set up in Moscow, Leningrad, in several capitals of autonomous republics, in kray and oblast administrative centers. A total of 332 specialized filling stations were allocated for these purposes in the RSFSR, including 302 conventional facilities and 30 bare-essentials dispensing units.

The time for which uniform petroleum products coupons are good has been reduced to 3 months. The procedure of issuing coupons to gasoline consumers has become more strict, and oversight over observance of regulations pertaining to allocated stocks has been tightened. New regulations have been drawn up, taking the increased demands into account, pertaining to maintaining records on petroleum products at bulk plants, dispensing stations and service stations, as well as pertaining to record keeping, custody and issue of coupons for petroleum products. The number of scheduled and surprise inspections of service station operations was increased; there were more than 66,000 of these in 1983.

Rigorous monitoring of implementation of specified measures and work effectiveness has been established by the People's Control Committee, the Ministry of Finance, the MVD and other USSR central establishments. The USSR

Council of Ministers and the Presidium of the RSFSR Council of Ministers regularly examine matters connected with implementation of the demands of the decree on the part of various ministries and agencies.

These measures have helped activate efforts locally and achieve some positive results, but many deficiencies have not yet been corrected.

Interruptions and restrictions in fuel supply for privately-owned motor vehicles are absolutely intolerable. However, the Committee continues to receive letters from citizens attesting to the fact that the situation is improving only slowly in Rostov, Stavropol', Krasnodar, Tula, and certain other administrations. What is happening is that on the one hand we are engaged in a strenuous effort to expand the network of filling stations for privately-owned motor vehicles, while on the other hand we are nullifying all this effort by failing to supply them with petroleum products.

Serious alarm is also being aroused by restrictions on dispensing fuel to long-haul trucks at filling stations in a number of oblasts, where a "local" truck receives a full tank of gasoline, while a "foreign" truck, transiting through, is limited to 20 liters. Such localistic tendencies must be halted immediately.

Provision of facilities to dispense fuel to privately-owned powerboats and outboards on rivers, lakes and reservoirs demands serious attention. There are approximately 700,000 such craft in the RSFSR, and they consume thousands of tons of gasoline over the course of a season's time. Mobilefueling facilities must be utilized more efficiently. Good prospects are opening up in this area for the employment of "container" dispensing units, as confirmed by the experience of the Tyumen Administration.

Adoption at service stations of an automated system of purchase of refined petroleum products by credit card, a practice which was born and tested in the Novosibirsk Administration, is an extremely important task, to the accomplishment of which the government attaches particular significance.

Minpribor [Ministry of Instrument Making, Automation Equipment and Control Systems] has commenced regular production of credit-card system equipment. This year we shall take delivery on 70 units, which are to be installed at service stations in Moscow, Leningrad, Gorkiy, and Novosibirsk. We must make these cities centers for instruction and training of specialist personnel from other administrations -- the Bashkir, Volgograd, Kuybyshev, Rostov, and Omsk, where the credit-card purchase system will be introduced in 1985-1986.

Ensuring the strictest economy and efficient utilization of refined petroleum products is unquestionably the main focal area of our efforts.

We are giving practical assistance in this matter to kolkhozes, sovkhoses, industrial, construction, and transport enterprises. At the initiative of inspectors in the Gorkiy Administration, for example, 25 farms have been allocated petroleum products storage equipment, while repair of gas pumps and tanks has been performed on 48 kolkhozes and sovkhoses. Patronship assistance has been given to 2,200 customers in the past year. As inspections indicate,

however, ministries, agencies, and local soviet and economic administrative bodies are not yet taking effective steps to achieve a radical improvement in utilization of petroleum products. There continue to occur at enterprises and organizations of various branches and sectors of the economy instances of squandering of and a wasteful attitude toward fuel resources; substantial losses and overconsumption beyond established standard amounts are occurring, as well as utilization of fuel other than for its earmarked purpose and sale of petroleum products to outside organizations and private individuals. Specific fuel consumption standards are not being observed by many enterprises, kolkhozes, and sovkhozes, record keeping and custody of fuels and lubricants are not being handled properly, and collection of drained crankcase oil is poorly organized. There are occurring considerable numbers of empty runs and exaggerated hauling volume figures in motor transport. Responsibility of management and administrative officials for implementation of organizational-technical measures which ensure meeting targets pertaining to reducing consumption norms and economizing in petroleum products is increasing too slowly.

The paramount task today is to strengthen adherence to rules and regulations on allocated stocks -- observance of discipline in supply and consumption of refined products at all levels of administration and management.

We must wage a most determined campaign against allocationless and above-allocation release of petroleum products to anybody whomsoever. An analysis we conducted indicates that as soon as we allow overdelivery, customers immediately commence overconsumption beyond established standards, and they fail to meet targets pertaining to economy of petroleum products. The Committee for its part will exercise closer oversight over this matter and will apply strict measures against officials who are guilty of or conceal other persons' violations of state discipline pertaining to allotment of petroleum products. Deliveries of petroleum products should be performed strictly in conformity with scheduled volumes of operations and ratified scheduled consumption standards.

Selection, placement, and education of cadres is of great importance in accomplishing all the tasks which face us. We must approach with a special measuring stick the selection of personnel for service stations, for service station personnel represent the Committee's largest employee group.

The level of inspection-auditing and preventive work to guard against theft and pilferage continues to be inadequate. Audits indicate that in spite of measures taken and punishment of officials guilty of offenses against socialist property, the number of violations is not diminishing. This indicates inadequate attention on the part of officials of administrations, bulk plants and other structural subdivisions toward selection of personnel and oversight over their work.

An all-out effort to reduce the number of empty runs offers a large reserve potential for achieving savings in automotive fuel. A great deal has been said and written about empty runs and efficient utilization of motor transport. There is a problem, and it must be resolved. The point in question here is truck empty runs connected with obtaining fuel.



Establishment and development of a network of public-use service stations has led to unwarranted elimination of fueling stations at the majority of existing and refusal to build them on the premises of new motor transport enterprises. At the present time only about 7 percent of the total number of motor transport enterprises in the RSFSR have their own filling-station facilities.

Analysis has shown that with an average distance of 2.2 kilometers from motor transport enterprises to filling stations, the magnitude of empty runs for fueling exceeds 3 billion kilometers per year, involving consumption of more than 800,000 tons of fuel.

The CPSU Central Committee and USSR Council of Ministers decree calls upon all ministries and agencies to build filling-station facilities in the period 1983-1986 on the premises of motor transport enterprises with a fleet of more than 250 vehicles, while sites for operations by mobile filling stations are to be set up at enterprises with from 50 to 250 vehicles. This opens up additional possibilities of achieving savings in refined petroleum products and increasing the efficiency of utilization of motor transport.

In connection with this, we should monitor the operations of ministry and agency enterprises in the localities pertaining to meeting the specified target, and we should emphatically address these matters in party and soviet bodies.

The need to regulate and control the consumption of petroleum products is also dictated by the fact that oil production is moving further and further away from densely-populated regions; transportation costs are increasing due to the increased hauling distances, while requirements in refined petroleum products are growing. The increased requirements can be met by imposing strict regulation and order in the consumption of petroleum products in all branches and sectors of the economy.

In conclusion we should state that all measures aimed at achieving savings in petroleum products will be effective if each and every individual understands the importance of a thrifty attitude toward oil and petroleum products and organizes things at his work station in such a manner as to close off all channels of inefficient and wasteful consumption of petroleum products.

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## OIL AND GAS

### BASHNEFTEGEOFIZIKA TRUST GIVES PROGRESS REPORT

Moscow NEFTYANIK in Russian No 6, Jun 84 pp 11-13

[Article, published under the heading "Milestones of a Workforce," by D. Yagodin, Ministry of Petroleum Industry press center correspondent: "Strides Into the Future"]

[Excerpts] On the basis of the 1983 work performance results, the Bashneftegeofizika Trust was a winner for the fifth time running in the All-Union Socialist Competition. The challenge Red Banner of the CPSU Central Committee, USSR Council of Ministers, All-Union Central Trade Union Council and All-Union Komsomol Central Committee will reside permanently with this workforce....

This fact alone is remarkable. Few enterprises can boast of such success. The work performance stability of any workforce depends on a large number of factors. We shall mention one such factor which is very worthy of note.

If trust officials mention their field unit which is operating on a vakhtovyy [so many days on, so many days off] schedule in the Fedorovskoye field in Western Siberia, they will most assuredly add that it is doing well in trust socialist competition.

A feeling for the new, innovativeness, and ingenuity are characteristic features of this workforce's performance. One example of this is the decisive break from conservatism in planning and performance evaluation. The trust's economic service, headed by chief economist G. D. Arngol'd, has drawn up, jointly with the Ministry, a system of criteria which focuses the departments and primary production components on increasing work efficiency and improving geological work results.

The geological project task [geologicheskoye zadaniye] has been adopted as the principal plan and performance appraisal indicator in place of estimated job cost, which is now used only as an accounting criterion. It was determined that accomplishment of the geological project task is preferable when estimated work volume is reduced from the original project specification than in plan fulfillment in monetary terms. The structure of the geological project task is being revised and new plan-estimate indicators are being established in connection with this. For example, on an experimental basis

the performance of prospecting parties is being evaluated not by number of structures but by oil resources contained in them.

The work order [zayavka], for example, constitutes the geological project task for a downhole logging party. Amount of wage bonus is determined taking three items into account: accomplishment of geological field project; accelerating, that is, reducing the time expended on accomplishing the job (for all practical purposes, for above-target labor productivity growth); quality of work performed (the quality coefficient is figured on the basis of the number of logs accepted with a mark of good, satisfactory, and reject).

Such an evaluation of the production activities of a geophysical enterprise or subdivision aims at achieving the end result in an optimal manner, with reduction of time to accomplish the job. And this approach is producing tangible results. It has been calculated that a 3-4 percent reduction in estimated expenditures on downhole logging will reduce cost of well construction in Bashkiria by 200,000 rubles.

The innovative nature of the work done by the trust's specialist personnel and the endeavor to find the best, sometimes unconventional solution to the problems which arise is also expressed in how the problem of personnel is being resolved in current conditions, where the influx of new manpower is very small. This is no simple matter. Geophysicists earn considerably more in Western Siberia, due to the harsh climatic conditions. In Bashkiria not everybody can endure many years of field work. And there is occurring a constant departure of the most highly-skilled operator personnel.

The trust decided not simply to wait for the requisite number of young specialist personnel to come from the petroleum higher and secondary schools. One and a half month operator training courses were set up for engineers of nongeophysical areas of specialization by the Ufa Petroleum Institute, as well as operator training courses at the Oktyabrsk Petroleum Technical School.

Other remedies were also tried. Help wanted advertisements resulted in recruitment of a group of about 20 persons who do not even have secondary specialized geophysics training. They were assigned to jobs with minimum salary; for a period of several months they did nothing but study the fundamentals of geology and geophysics, and were taught the rudiments of geophysical equipment and safety procedures. These persons were then assigned to seismic prospecting parties as operator-technicians, jobs which many of them continue to hold today.

The people in the trust also did a fine job of organizing the work operations of their field unit in Western Siberia. This is attested by the letters of thanks written to the trust from Surgut Drilling Operations Administration No 1 (it is unprecedented for drilling crews to thank well loggers!).

At the end of 1979, when the Bashkir geophysicists first came to work in the Fedorovskoye field, today's production facilities had not even begun to exist. It took only 2 years to build a decent, heated facility for the repair of all types of equipment, a dormitory accommodating more than a hundred persons, a dining hall, and a bathhouse.

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PHYSICAL PROPERTIES OF RESERVOIR ROCK ANALYZED

Baku AZERBAYDZHANSKOYE NEFTYANOYE KHOZYAYSTVO in Russian No 8, Aug 84 pp 5-10

[Article by Ye. I. Bayuk, A. A. Fomin, P. P. Petrik (IGIRGI) and T. M. Salekhli (YuzhVNIIGeofizika (not further identified)): "Reservoir Properties of Rock from Deep Wells in Azerbaijan at High Pressure"]

[Text] The purpose of our investigation was to compare the deformational, electric and reservoir properties of rock from an igneous-sedimentary bed of the Muradkhanly area and of terrigenous rock of the productive bed. It was with this purpose in mind that samples were taken from several wells at the Muradkhanly deposit at a depth of 3.3-4.3 km, and from deposits in the productive bed of the Lower Kura depression at a depth of 3.6-5 km.

Rock from the Muradkhanly deposit is represented by porphyrite, quartz andesite, porphyric microbreccia interlayered by biotite trachy-andesite, plagioclastic andesite and so on. Coarse-grained, poorly graded tuffaceous sandstone possessing an irregular texture was found among them (sample 33/77). Besides mineral fragments, it contains a predominant quantity of fragments of igneous rock with a cinder structure, cemented together by a polymineral basalt-powder cement. Carbonate masks the primary fragmentary structure of the rock in some samples (73/77 and others).

Samples from the productive bed are represented by fine and coarse-grained sandstone containing fragments of quartz, feldspar, microquartzite and micaceous chlorite shale, as well as a small quantity of igneous rock fragments. Fragments are cemented by carbonate and chlorite basalt-powder cement.

The rock samples were tested with high pressure apparatus developed by the IGIIRGI [Institute of Geology and Exploitation of Fossil Fuels] [1,2]. Volumetric compression was raised to 100 MPa in the experiments. Samples to be tested were placed in a thin flexible copper or fluoroplastic envelope and saturated with bed water. Liquid pore pressure in the rock was maintained equal to hydrostatic at the depth of occurrence. Flexible tensometric brackets with strain gauges glued onto them were used to measure deformations. Resistivity was measured with a 2-electrode system using a balanced alternating current quadripolar bridge. Gas permeability was determined from steady-state nitrogen filtration on the basis of measurements of nitrogen consumption and pressure at the ends of the sample.

As effective voltage rises with increasing deformation of the sample in the course of the experiment, relative resistivity grows while the compressibility and permeability coefficients decrease. An example of curves showing the dependence of physical characteristics on effective stress for tufaceous sandstone (sample 33/77), which is a representative of altered effusive rock from the Muradkhanly deposit, can be found in Figure 1. As is evident from Figure 1, all curves vary monotonously with growth in effective stress to a value significantly exceeding that corresponding to the depth of occurrence of the rock.

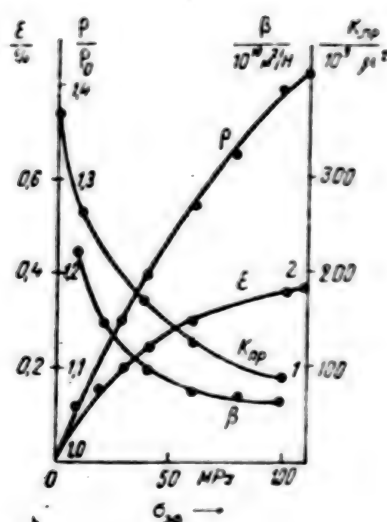


Figure 1. Dependence of Deformation  $\epsilon$ , Resistivity  $\rho$  and the Coefficients of Compressibility  $\beta$  and Permeability  $K_{np}$  on Effective Stress  $\sigma_{3\phi}$  for Tufaceous Sandstone (Sample 33/77)

Abnormalities were almost always observed in the curves for sandstone from the productive bed at an effective stress close to that recorded at the depth at which the rock was sampled (Figure 2), which is associated with irreversible changes in sedimentary rock [1,3]. Igneous rock does not possess this feature, which depends on the conditions under which it is formed.

Table 1 provides experimentally obtained values for deformations  $\epsilon$ , resistivity  $\rho/\rho_0$  and the coefficients of compressibility  $\beta$  and permeability  $K_{np}$  at different values of effective stress for igneous rock from the Muradkhanly deposit. Despite the rather significant porosity of porphyrites (from 10 to 17 percent), they do possess very low permeability, which rarely exceeds  $1.5 \cdot 10^{-3} \mu m^2$  when in a stressed state corresponding to their depth of occurrence. Dolomite and carbonate rock are characterized by permeability that is just as low. This is explained by the structure of pore spaces in such rock: As a rule such rock is dominated by isolated pores, which is precisely why its resistivity is large, increasing in response to pressure (by 50-80 percent).

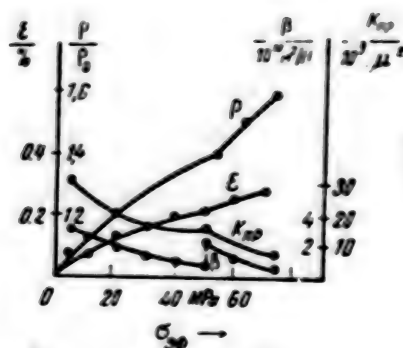


Figure 2. Dependence of Deformation  $\epsilon$ , Resistivity  $\rho/\rho_0$  and the Coefficients of Compressibility  $\beta$  and Permeability  $K_{mp}$  on Effective Stress  $\sigma_{3\phi}$  for Polymictic Sandstone (Sample 76/77)

Altered effusive rock--tufaceous sandstone (sample 33/77) and tufa cinders (sample 65/77)--is characterized by permeability that is greater by two orders of magnitude. This rock is classified as moderately permeable in terms of the coefficients of permeability, since besides poor spaces it contains cracks brought into being by its heterogeneous composition and presence of igneous rock fragments and basalt powder polymineral cement. This is precisely the sort of rock that can serve as reservoirs in the igneous rock of the Muradkhanly deposit. As is evident from Table 1, resistivity is observed to increase to a relatively lesser degree in such rock. A large quantity of filtration pathways promotes better conductivity, which is why resistivity varies by only 20-30 percent when the effective stress  $\sigma_H$  corresponding to the depth of occurrence of the rock is attained. Under similar conditions resistivity increases by 60 percent and more in the other kinds of igneous rock. The low compressibility of porphyrites keeps the porosity coefficient almost constant at great depths.

Table 2 shows experimental results for sandstone-aleurite rock from the productive bed in the Lower Kura depression. The porosity of the analyzed rock is 9-24 percent. In this case permeability is significantly higher than for igneous rock with identical porosity. Moreover relative change in permeability depending on effective stress is almost twice lower. The lowest permeability is characteristic of aleurolite and graywacke sandstone (samples 99/77 and 103/77). For other rock the permeability coefficient is  $(5-15) \cdot 10^{-3} \mu^2$  at the depth of occurrence--greater than for porphyrite.

As with rock from the igneous facies, a mutual relationship was observed between the permeability coefficient and resistivity for sandstone-aleurite rock. This dependence is shown in Figure 3. The coefficient of permeability is plotted on the graph in logarithmic scale. Experimental values for resistivity and the permeability coefficient were recorded at an effective stress of 50 MPa--that is, in conditions close to those encountered in the bed for most of the tested rock. Establishment of such a dependence has important significance to the tasks of oil field geophysics and to pinpointing the calculated parameters of oil deposits.

Table 1

Rock	Номер образца (1)	Номер скважины (2)	Интервал отбора, м (3)	Пористость, $f_p$ , % (4)	$\sigma_n$ , МПа (5)	Параметры (6)	$\sigma_{\text{ф}}$ , МПа				$\epsilon_n$
							10	40	80	100	
Tufaceous sandstone with igneous rock fragments	33/77	3	3381-3385	13,5	44	$\epsilon_1$ , %	0,07	0,19	0,28	0,29	0,29
						$\epsilon_2$ , %	0,10	0,24	0,34	0,37	0,37
						$\beta$ , $10^{-10}$ м <sup>3</sup> /Н	2,2	0,92	0,78	0,75	0,75
						$K_{np}$ , $10^3$ МПа <sup>2</sup>	1,06 257	1,20 155	1,38 100	1,42 87	1,41 130
Decrystallized porphyrite	64/77	27	3560-3568	12,8	46	$\rho/\rho_0$	1,18	1,50	1,80	1,87	1,81
						$K_{np}$ , $10^3$ МПа <sup>2</sup>	1,35	0,75	0,29	0,22	0,21
Andesite-porphyrityte	63/77	27	3454-3463	1,32	—	$\epsilon_1$ , %	0,06	0,14	0,21	—	0,15
						$\epsilon_2$ , %	0,10	0,22	0,31	—	0,21
						$\beta$ , $10^{-10}$ м <sup>3</sup> /Н	1,7	0,7	0,6	—	0,7
						$K_{np}$ , $10^3$ МПа <sup>2</sup>	2,16	0,75	0,26	0,18	0,21
Tufa cinders	65/77	3	3708-3714	19,85	48	$\epsilon_1$ , %	0,08	0,26	0,42	—	0,22
						$\rho/\rho_0$	1,08	1,22	1,37	—	1,25
Andesite porphyrite	72/77	19	4086-4090	15,6	53	$K_{np}$ , $10^3$ МПа <sup>2</sup>	1,63	125	87	—	103
						$\epsilon_1$ , %	0,07	0,17	0,30	0,34	0,31
						$\rho/\rho_0$	1,14	1,40	1,73	1,83	1,81
						$K_{np}$ , $10^3$ МПа <sup>2</sup>	4,05	2,25	1,05	0,67	1,25
Carbonate rock	73/77	19	4090-4095	11,6	53	$\rho/\rho_0$	1,12	1,41	1,73	1,85	1,81
						$K_{np}$ , $10^3$ МПа <sup>2</sup>	5,6	1,75	0,70	0,55	1,30
Chloritized andesite porphyrite	60/77	21	4260-4268	17,7	55	$\epsilon_1$ , %	0,07	0,18	0,27	—	0,22
						$\epsilon_2$ , %	0,11	0,24	0,35	—	0,29
						$\beta$ , $10^{-10}$ м <sup>3</sup> /Н	0,92	0,37	0,12	0,08	0,22
						$K_{np}$ , $10^3$ МПа <sup>2</sup>	1,6	0,6	0,55	—	0,55
Dolomite	62/77	12	4172-4176	4,15	54	$\epsilon_1$ , %	0,06	0,15	0,28	0,32	0,18
						$\rho/\rho_0$	1,17	1,49	1,78	1,85	1,59
						$K_{np}$ , $10^3$ МПа <sup>2</sup>	1,60	1,05	0,42	0,37	0,9

Key:

1. Sample number
2. Well number

3. Sampling interval, m

4. Porosity

5. MPa

6. Parameters

7.  $\mu$

Table 2

Rock	Номер образца (1)	Номер скважины (2)	Место отбора (3)	Интервал отбора, м (4)	Пористость, $K_p$ , % (5)	$\sigma_{пл}$ , МПа (6)	Параметры (7)	$\sigma_{пл}$ , МПа			
								10	40	80	100
Graywacke sandstone	99/77	104	Пирсагат (8)	3612—3616	9,7	47	$\epsilon_{11}$ , % $K_{пр}$ , $10^3$ МКМ <sup>2</sup> (12)	0,11 1,25 9,27	0,20 1,62 6,42	0,22 1,91 1,99	0,22 2,02 1,31
Polymictic sandstone	96/77	104	"	3630—3635	16,6	47	$\epsilon_{11}$ , % $K_{пр}$ , $10^3$ МКМ <sup>2</sup>	0,09 1,08	0,18 1,28	0,25 1,60	—
"	75/77	100	Кюрсани (9)	3635—3640	12,8	47	$\epsilon_{11}$ , % $K_{пр}$ , $10^3$ МКМ <sup>2</sup>	1,15 7,3	1,39 5,5	1,69 3,2	1,92 2,5
"	76/77	100	"	3846—3892	11,7	50	$\epsilon_{11}$ , % $K_{пр}$ , $10^3$ МКМ <sup>2</sup>	0,08 0,13	0,21 0,32	0,27 0,46	0,28 0,47
Clay-aleurite sandstone	99/77	100	"	4141—4451	23,8	58	$K_{пр}$ , $10^3$ МКМ <sup>2</sup>	63	46	32	30
Medium grained tuffaceous sandstone	100/77	100	"	4228—4832	16,7	63	$\epsilon_{11}$ , % $K_{пр}$ , $10^3$ МКМ <sup>2</sup>	0,11 3,46	0,27 1,62	0,33 0,80	—
Aleurite	101/77	421	(10)	4695—4705	24,4	61	$\epsilon_{11}$ , % $K_{пр}$ , $10^3$ МКМ <sup>2</sup>	1,33	1,66	1,71	—
Graywacke sandstone	103/77	26	Кюрсани (11)	5020—5026	17,2	63	$\epsilon_{11}$ , % $K_{пр}$ , $10^3$ МКМ <sup>2</sup>	0,08 1,05	0,18 1,15	—	—
								60	48,2	41	40,6

Key:

1. Sample number
2. Well number
3. Sampling location
4. Sampling interval, m
5. Porosity
6. MPa
7. Parameters
8. Pirsagat
9. Kyursaniya
10. Kuyrovdag
11. Byandozan
12. "



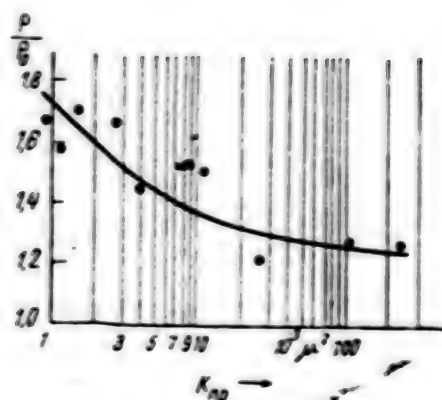


Figure 3. Relationship Between Permeability Coefficient  $K$  and Resistivity  $\rho/\rho_0$  at an Effective Stress of 50 MPa for Tested Rock

### Conclusions

Weakly modified rock from igneous facies having a porosity of 9-17 percent is characterized by a small permeability coefficient, which decreases considerably with pressure, and rarely exceeds  $1.5 \times 10^{-3} \text{ u}^2$  at the depth of occurrence. This means that this rock contains isolated pores predominantly, which is also confirmed by the sharp increase in resistivity with pressure.

The permeability coefficient of modified igneous rock having a braccia structure and a porosity of 14-20 percent is a hundred times larger. The resistivity of such rock increases with pressure two to three times more weakly than is the case for weakly modified igneous rock.

Rock from the productive bed exhibits better filtration characteristics than weakly modified igneous rock of the same porosity, and worsening of these characteristics with depth (pressure) proceeds less intensively.

The relationship between the permeability coefficient and resistivity of rock at an effective stress close to the bed value was established experimentally.

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## OIL AND GAS

### OFFSHORE OIL, GAS EXTRACTION IMPOSES SPECIFIC REQUIREMENTS

Baku AZERBAYDZHANSKOYE NEFTYANOYE KHOZYAYSTVO in Russian No 8, Aug 84 pp 33-36

[Article by A. B. Suleymanov, NIPI Gipromorneftegaz [possibly State Institute for the Design of Offshore Oil and Gas Enterprises]: "Features of Offshore Petroleum and Gas Extraction"]

[Text] An intensive effort has been conducted in recent years to develop oil and gas bearing deposits occurring in shelf zones.

Experience accumulated by Azerbaijan oilmen in developing the oil and gas resources of the Caspian Sea allows us to reveal the typical technical and technological features of oil and gas extraction, the requirements for intensifying extraction and to insure maximum extraction from the reserves to offshore deposits.

The features of developing offshore oil and gas deposits are:

1. The need for creating special hydraulic engineering structures and floating technical resources for geophysical and geological exploratory operations, and for drilling exploratory and producing wells.
2. The need for drilling directional cluster wells from individual permanent platforms, from pier-serviced platforms, from manmade islets, from self-hoisting and semisubmerged floating rigs and from other surface and underwater structures.
3. The demand for creating new forms of marine transportation (floating crane-assembly ships, maintenance vessels, pipelaying barges and other special vessels) and utilizing existing forms of marine transportation for building oil field facilities right at sea, for their maintenance in the course of geological explorations and geophysical research, for equipping, drilling, operating and repairing wells and for collecting and transporting their products.
4. The need for solving additional technical, technological and economic problems in the course of planning the development of oil, gas and gas condensate deposits:

determining the minimum necessary volume of information on the initial parameters of the object, and time variations necessary for

optimizing the planning, monitoring and analysis of the development of oil and gas deposits;

making wide use analytical methods to thoroughly study the features of oil and gas extraction processes. For control of offshore oil and gas extraction processes to be successful, in addition to information on the characteristics of the deposit at individual points, it is important for us to know the integral parameters characterizing the bed as a whole.

Construction of a model that most adequately reflects the real object may be beneficial here. It has been established that a sampling method permitting determination of integral parameters on the basis of a sufficiently small data sample may be useful to modeling.

Use of these and other mathematical methods as well as various diagnostic methods making wide use of computers to reveal operational problems is becoming an urgent necessity, since with their help we can successfully solve problems associated with planning and controlling processes involved in sensible and effective development of offshore deposits of oil and gas; choosing, in the planning stage, the exploitation network that is best suited to the given deposit and which would preclude the future need for drilling additional wells, which is associated with extreme difficulties in marine conditions; locating new hydraulic engineering structures to permit the drilling of additional wells may turn out to be impossible because of the equipment present at the deposit and the existing network of underwater utility lines;

the need for selecting the sensible design and quantity of permanent platforms, pier-serviced platforms, floating work decks and other structures so that the number of wells located on them would be optimum (depending on the depth of occurrence of the beds, the well drilling time, well productivity, distances between their mouths, the anticipated mouth pressures and so on). In this case the deviation of the shafts of slant wells from the vertical must be such that their normal operation would be insured throughout their entire period of service;

using progressive methods for intensifying extraction of oil and gas and raising the oil and gas output of beds right from the beginning of development of the deposits, so as to keep the deposit stimulating processes from falling behind the rate of exploitation of the reserves;

the need for obtaining initial information on deposit parameters and using anticipatory methods for development both in relation to bed area and bed thickness (in multiple-bed deposits).

If the technical and economic problems associated with developing oil and gas deposits are to be solved sensibly, and if exploitation of these deposits is to be accelerated, the following must be accomplished:

wide use of different designs and methods of simultaneous-separate exploitation of deposits in order to hasten the rate of development of multiple-bed deposits and reduce the number of producing wells;

acceleration of well construction by creating dependable equipment and progressive procedures for drilling slant wells with the necessary deviation from the vertical, and creation of the conditions for autonomous work by drilling brigades (their work should not depend on hydrometeorological conditions at sea) on crowded platforms and on pier-serviced and other platforms. Acceleration of construction of well clusters on platforms will make it possible to finish the drilling of all planned wells in a short time, and to postpone their development until all of this is finished. This would do away with the need for simultaneous drilling and operation of wells;

in the course of planning and building hydraulic structures (and other resources), we must tie in their life and reliability with the time it would take to develop the oil and gas deposits (that is, with the periods of maximum oil extraction from the beds and from the entire deposit as a whole).

5. Creation of specialized shore bases for the manufacture of hydraulic engineering structures, modular production complexes, watercraft and other equipment for drilling and extracting oil and gas, and for building and servicing an offshore oil field production complex.

6. The need for encouraging the participation of industrial sectors such as shipbuilding, machine building, metallurgy, instrument making, electrical engineering, electronics, the merchant marine, chemistry, industrial and civil construction and many other specialized sectors as well as their scientific research and planning institutes and organizations in order to solve the great and complex problems associated with developing oil and gas resources in offshore areas.

7. Creation of the technical resources for development, exploitation and repair of offshore wells, and namely: operationally reliable packers, safety valves, gas lift valves, well chambers and cabling for all of the necessary operations with well equipment; pump and compressor tubing with sealed couplings, pipe shock absorbers, adjustable connectors, mouth, line and other safety valves and automated remote-controlled modular units. All of this equipment should promote extraction of products from the wells without complications--gushers, fires, springs and so on.

8. Solution of the problems of simultaneous drilling, exploitation and repair of closely spaced wells, associated with the long time it takes to build them.

9. The need for creating small-sized, operationally reliable modular automated equipment to accelerate construction of well drilling, operation and repair equipment, and development of platforms for collection and transportation of products extracted at sea.

10. Solution of scientific and design problems associated with creating new well drilling, operating and repair procedures and techniques entirely different from traditional ones, such that well mouths could be located above the water line and such facilities could be serviced both beneath the water and from special floating resources.



11. Solution of the problems associated with developing marine and ocean shelves and the especially harsh hydrometeorological conditions of the north and of arctic and antarctic regions, so that equipment to be used in the drilling and establishment of oil fields, in extraction of oil and gas and in transporting products in areas of drifting ice, icebergs, frequent hurricane winds, strong bottom currents and so on could be created.

12. The need for creating special technical resources and production processes as well as floating rigs and physicochemical substances insuring protection of the marine environment and the air basin in the course of geological prospecting, geophysical and drilling operations, operation and repair of wells, collection and transportation of their products, and maintenance of oil field hardware at offshore oil and gas deposits presently under development.

13. Solution of a complex of problems associated with creating the technical resources for personnel involved in the development of offshore oil and gas deposits and developing industrial safety and labor protection measures. The need for safe performance of jobs within the limited space of specialized structures, and in the presence of higher noise, vibrations, moisture and so on, arises in this case.

14. Special physical and psychological preparation of laborers, engineers and technicians for work at sea.

Teaching offshore oil and gas workers the safe work methods of developing underwater deposits is a most important obligation of the organizers of such production. Special attention must be turned to training divers, since accelerated and safe conduct of the work of developing deposits far beneath sea level and uninterrupted maintenance of offshore oil and gas extraction processes depend in many ways on their professional skills.

15. The need for creating a hydrometeorological service and observation points to permit timely acquisition of the information needed by offshore oilmen and for implementing the necessary safety measures.

16. The need for providing firefighting teams and gas and oil blowout prevention and control services with special equipment for fast containment and elimination of blowouts and fires at sea.

Consideration of these features and fulfillment of the requirements for sensible development of oil and gas deposits, especially in areas of great water depth, such as the multiple-bed 28 April' deposit in the Caspian Sea, development of which requires creation of expensive structures and equipment, will make it possible to develop such deposits in short time by economically feasible methods.

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## OIL AND GAS

### CONFERENCE DISCUSSES PROGRESS WITH SAATLY ULTRADEEP WELL

Baku AZERBAYDZHANSKOYE NEFTYANOYE KHOZYAYSTVO in Russian No 8, Aug 84 p 62

[Article by N. T. Akhverdiyev: "Fourth Coordination Conference on the Saatly Ultradeep Well"]

[Text] The Saatly ultradeep well is being drilled with the purpose of studying the nature of the earth's deeper layers, the composition of rock in ancient deposits, including in the granitic and basalt layers, for geological interpretation of the seismic stratification of the earth's crust, to study temperature conditions and to determine the nature of particular problems associated with developing and improving drilling methods and the techniques of geological and geophysical research at great depths.

Up until now, our impressions of the deeper zones of the earth's crust have been based primarily on geophysical data, which are often debatable due to the absence of many physical characteristics.

Geophysical methods provide only indirect information on the composition and state of the lower layers of the earth's crust and the upper mantle, while drilling of an ultradeep well would make it possible to obtain facts directly from the deep layers of the earth's crust.

A coordination conference on the Saatly ultradeep well SG-1-15000 was held from 5 to 7 June 1984 in Baku in order to reveal the results of integrated geological-geophysical research, and of analysis of the equipment and procedures of drilling to a depth of 8,000 m.

Over 150 representatives of 35 organizations took part in the conference proceedings and gave reports.

Scientists obtained important geological and geophysical results: Geological-geophysical, petrological, mineralogical, geochemical, nuclear-geophysical and petrophysical methods were used to subdivide the igneous layer thus far exposed. Consistent results made it possible to ascribe the layer to the Jurassic Period on the basis of faunal and radiological data.

The cyclicity of the formation series was established on the basis of a detailed study of the matter composing the rock. Vertical metamorphic zonality exhibiting the lower stages of metamorphism was revealed. Data were obtained

permitting interpretation of the geophysical boundary in the section at a depth of about 5,000 m, which had previously been treated as the roof of a consolidated crust; it was actually found to be a boundary between low-rate rock in a relic metamorphic facies and denser rock of a propylitization zone.

The model of the deep structure in the vicinity of the Saatly well was updated by additional terrestrial geophysical investigations.

The first stage of cased hole sidetracking using existing drilling tools and equipment for monitoring well shaft parameters (inclinometer, profiler, down-hole gauge) was carried out, and the zones of absorption of drilling mud were determined and isolated.

It was noted at the conference that there are a number of shortcomings in the progress of integrated research.

Not all forms of geophysical research foreseen by the program for the second stage of drilling were completed. Not enough work was done by the Special Design and Technological Office of Petroleum and Gas associated with geophysical research on the shaft of Saatly well SG-1. This research has to be conducted if we are to study drilling procedures and cased hole sidetracking. Nor has enough research associated with determining the configuration and deflections of the well shaft been conducted. Fishing tools made necessary by the existing ratios between well and drilling tool diameters and necessary for work in narrow wells are unavailable.

As of the moment SG-1 is the sole ultradeep well being drilled within the limits of the Al'piyskiy mobile belt. Having reached a depth of 8,267 m, the well produced the most important geological results. The drilling refuted the projected section of the cap of the Transcaucasian median massif: A large gap in sediment formation and many other data were revealed.

Basic problems of general geological interest such as the nature of the perturbing masses of the Talysh-Vandamskiy gravity maximum, the material expression of the second geophysical interface at a depth of 9,000 m and others will be clarified later on when the well attains its planned depth--15,000 m.

A number of resolutions were adopted on the basis of the reports that were given.

It was deemed suitable and necessary to resolve the problems associated with continuing the drilling of SG-1 to its planned depth.

Reports and statements concerned with sidetracking a second well shaft elicited interest and debate among the conference participants. These reports were discussed by many scientists, who proposed the appropriate procedures for sidetracking the second well shaft.

A work plan of integrated research for 1984-1985 and the content of the final report for the 11th Five-Year Plan were examined and approved by the conference participants.

The conference participants included the scientific secretary of the Interdepartmental Scientific Council of the State Committee for Science and Technology N. I. Andrianov, deputy chairman of the Scientific Council for Integrated Research on the Earth's Crust and the Upper Mantle in the Caucasus of the USSR Academy of Sciences M. A. Aleksidze, Azneft' Production Association General Director B. A. Gadzhiyev, Azneft' Production Association Deputy General Directors A. N. Guseynov, O. N. Ibragimov and Kh. B. Mirzoyev, IPGNGM [not further identified] Director M. T. Abasov, Director of the Institute of Geology of Azerbaijan SSR Academy of Sciences Academician A. Ali-Zade, AzNIPIneft' [probably State Scientific Research Institute for the Petroleum Industry of Azerbaijan] Director M. K. Seid-Rza, Azerinform representative A. M. Gol'denberg, Azerbaijan SSR State Planning Committee representatives V. K. Khalilzade and A. Yu. Aliyev, representatives of the AzINEFTEKHIM imeni M. Azizbekov and M. P. Gulizade, USSR Council of Ministers Scientific Council representatives V. N. Sholpo and Yu. P. Vityapin, and many others.

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GASES OF SAATLY ULTRADEEP CORE ANALYZED

Baku AZERBAYDZHANSKOYE NEFTYANOYE KHOZYAYSTVO in Russian No 9, Sep 84 pp 6-9

[Article by F. G. Dadashev, I. S. Guliyev, N. A. Dmitriyeva (Institute of Geology of the Azerbaijan SSR Academy of Sciences), T. A. Zhuykova and S. P. Levshunova (VNIGNI): "Investigation of the Gas Phase of Rock Exposed by the Saatly Ultradeep Well"]

[Text] Investigation of the gas phase of rock exposed by the Saatly Ultradeep Well No 1 is part of the program for comprehensive investigation of the solid, liquid and gas phases of the earth's crust and the nature of their variation with depth.

The well exposed deposits of the Apsheron and Akchagyl stages, the productive bed, the Sarmat stage and an Upper Cretaceous period. The section is represented by clay, sandstone, argillite and volcanogenic formations of an andesite-basalt formation. A mud log, clay drilling mud and core material were used to study the gas phase.

A chemical degassing method developed by the VNIGNI [Scientific Research Institute of Geological Prospecting for Petroleum], based on acid decomposition of rock and subsequent analysis of the gas phase on a chromatograph, was used to study sedimentary rock.

Volcanogenic rock was studied by the thermal vacuum degassing method developed by the All-Union Scientific Research Institute of Nuclear Geophysics and Geochemistry and entailing the heating of a batch of rock in an insulated vessel followed by transportation of gas by a current of a gas vehicle into the distributing columns of a chromatograph.

Mud logging is the sole method of continuous observation of change in hydrocarbon saturation within the section. Actual mud logging material extending to a depth of 7,500 m was used. Average values were calculated using a procedure developed earlier (by N. A. Dmitriyeva, 1972). The distribution of average gas readings among different stratigraphic intervals exhibits a tendency to increase from quaternary deposits (0.26 percent), to Upper Cretaceous deposits (0.49 percent). Intervals of relatively high gas saturation can be distinguished in the cross section of Upper Cretaceous deposits: 4,430-4,580 m--0.62 percent, 4,880-5,030 m--0.63 percent, 5,030-5,130 m--0.93 percent.



Gas sorbed and occluded by sedimentary rock was studied by the chemical degassing method (Table 1).

Table 1

(1) Интервал отбора керна, м	(2) Возраст	(3) Содержание УВ газа в карбонат- ной части поро- ды, см <sup>3</sup> /кг	(4) Удельное содер- жание газа в кар- бонатной час- ти породы, см <sup>3</sup> /кг	(5) Групповой углеводородный состав, %						
				CH <sub>4</sub>	C <sub>2</sub> H <sub>6</sub>	C <sub>3</sub> H <sub>8</sub>	C <sub>4</sub> H <sub>10</sub>	i-C <sub>4</sub> H <sub>10</sub>	n-C <sub>4</sub> H <sub>10</sub>	i-C <sub>5</sub> H <sub>12</sub>
1583—1588	Апшерон	(6) 0.77	3.73	90.88	4.21	1.38	—	0.48	0.42	0.53
1767—1772	То же	(7) 0.89	4.31	86.26	7.53	2.62	0.07	0.50	0.48	0.75
1813—1818	.	—	—	89.20	6.77	2.20	0.05	0.44	0.35	0.62
2086—2092	Акчагыл	(8) 0.72	3.45	92.52	4.53	1.55	0.02	0.28	0.24	0.70
2203—2210	То же	1.23	5.84	91.35	5.63	1.37	0.10	0.37	0.32	0.65
2259—2264	ПГ (9)	0.98	3.88	89.06	7.21	2.04	0.004	0.36	0.38	0.67
2480—2486	То же	0.86	3.63	90.26	7.04	1.44	0.012	0.37	0.31	0.56
2590—2595	.	1.0	6.02	92.16	4.94	1.51	0.07	0.36	0.35	0.52
2692.5—2700	.	—	—	91.56	5.10	1.37	0.06	0.37	0.34	0.65
2707.5—2715	.	0.25	2.96	94.24	2.72	1.53	0.045	0.27	0.18	0.65
2788—2796	Сармат (10)	0.97	9.65	84.91	8.74	3.74	0.013	0.83	0.76	0.63
2803—2811	То же	0.85	6.34	91.54	4.19	1.81	0.008	0.41	0.56	0.46
	Верхний (11)									
3090—3095	мел	4.42	4.61	83.82	10.52	3.37	0.005	0.67	0.58	0.83
3201—3206	То же	3.65	3.72	86.89	8.84	2.18	0.06	0.56	0.43	0.78
3286—3291	.	5.22	5.31	85.92	9.06	3.13	0.0016	0.56	0.24	0.83

Key:

- |  |                      |
|--|----------------------|
| 1. Core sampling interval  | 7. As above          |
| 2. Age   | 8. Akchagyl          |
| 3. Hydrocarbon gas concentration in carbonate portion of rock, cm <sup>3</sup> /kg | 9. Productive bed    |
| 4. Relative gas concentration in carbonate portion of rock, cm <sup>3</sup> /kg    | 10. Sarmat           |
| 5. Hydrocarbon group composition, %  | 11. Upper Cretaceous |
| 6. Apsheron  |                      |

Apsheron deposits are represented by limestone argillite transforming into limestone aleurolite down the section. The concentration of sorbed hydrocarbon gases is 0.72-1.83 cm<sup>3</sup>/kg. Maximum concentrations were noted in argillite, and they were characterized by gas of a "rich" composition (CH<sub>4</sub>--50.95%). A higher concentration of C<sub>n</sub>H<sub>2n</sub> in these samples indicates syngenetic origin of gases in argillite. Gases are dryer in lower-lying aleurolite: CH<sub>4</sub>--90.45-94.91 percent, with the ratio of isomers to n-butane being greater than 1. The concentration of organic substances is 0.27-0.38 percent, while that of bituminous substances is 0.000 n percent.

Akchagyl deposits consist of fine poorly rounded sandstone and aleurolite grains and limestone containing 0.18-0.28 percent organic matter and 0.002-0.005 percent bituminous substances. The quantity of sorbed hydrocarbon gases is 0.58-1.23 cm<sup>3</sup>/kg, while the proportion of methane in the hydrocarbon group composition is 88.54-91.35.

The productive bed, which was exposed in the 2,259-2,803 m interval, is represented by limestone aleurolite which gives way down the section to medium and fine grained sandstone. The concentration of hydrocarbon gases is low, but it is higher in the upper member of argillite and aleurolite (0.18-1.0 cm<sup>3</sup>/kg) than in the lower sandstone member (0.22-0.29 cm<sup>3</sup>/kg), which is consistent with the distribution of bituminous substances. A rather dry gas composition is generally characteristic of the bed (CH<sub>4</sub>--90-96 percent); however, the gas composition is richer (CH<sub>4</sub>--79.6-84.9 percent) in aleurolite (2,371-2,376 m, 2,620-2,625 m, 2,788-2,796 m). As a rule, hexane is not recorded among the hydrocarbon gases and the CH<sub>4</sub> concentration is 1.1·10<sup>-2</sup> percent in the upper argillite member and 2.05-5.51·10<sup>-2</sup> percent in aleurolite, which is generally lower than in sandstone (1.6-14.77 percent).

Table 2

(1) Глубина отбора керны, м	(2) При температуре 300°C							
	CH <sub>4</sub>	C <sub>2</sub> H <sub>6</sub>	C <sub>3</sub> H <sub>8</sub>	C <sub>4</sub> H <sub>10</sub>	C <sub>5</sub> H <sub>12</sub>	$\frac{i-C_4H_{10}}{n-C_4H_{10}}$	$\frac{i-C_5H_{12}}{n-C_5H_{12}}$	$\frac{i-C_6H_{14}}{n-C_6H_{14}}$
5133-5136	21,1	(3) Следы	5,28	5,0	6,28	—	$\frac{24,0}{—}$	—
5403-5408	4,2	—	2,6	—	3,7	—	$\frac{2,8}{2,20}$	—
5505-5509	21,1	—	2,61	—	6,28	—	$\frac{24,0}{—}$	—
5740-5745	53,7	5,1	28,8	4,54	71,3	Следы	$\frac{170,0}{11,20}$	$\frac{9,6}{—}$
6208-6212	9,3	—	5,8	—	—	—	$\frac{360}{—}$	—
6740-6745	—	—	—	—	—	—	$\frac{26}{—}$	—
7148-7151	12,6	—	7,9	2,5	9,4	—	$\frac{48}{—}$	—
7554-7587	21,1	Следы	17,6	—	3,76	—	$\frac{28,8}{—}$	—

Note: The units for the composition of gas extracted from the core are cm<sup>3</sup>/kg·10<sup>-4</sup>.

Key:

1. Core sampling depth, m
2. At 300°C

3. Traces

Table 3

(1) Глубина отбора керна, м	(2) При температуре 300°C								При температу- ре 500°C (3)	
	CH <sub>4</sub>	C <sub>2</sub> H <sub>6</sub>	C <sub>3</sub> H <sub>8</sub>	C <sub>4</sub> H <sub>10</sub>	C <sub>5</sub> H <sub>12</sub>	$\frac{i-C_4H_{10}}{n-C_4H_{10}}$	$\frac{i-C_5H_{12}}{n-C_5H_{12}}$	$\frac{i-C_6H_{14}}{n-C_6H_{14}}$	N <sub>2</sub>	O <sub>2</sub>
5133-5136	147,0	42,6	137,0	20,0	361,0	$\frac{3,0}{180,0}$	$\frac{1195,2}{73,9}$	—	61,78	855,5
5403-5408	949,5	161,8	759,4	82,5	1387,7	$\frac{28,0}{21,0}$	—	—	9,3	162,8
5505-5509	717,0	170,0	1346	75,0	565,2	$\frac{54}{149,7}$	$\frac{7630}{1500}$	$\frac{105,6}{—}$	119,9	493,6
5740-5745	7826,0	464,7	2880,0	310,0	6090,3	$\frac{81,8}{—}$	—	—	98,8	377,7
5800-5804	—	—	—	—	—	—	—	—	(4) Следы	580,2
6208-6212	675,2	12,5	410,6	50,0	1109	$\frac{93,3}{62,4}$	$\frac{1172}{35,3}$	—	17,6	4617
6740-6745	179,3	14,2	79,2	12,5	204,1	—	$\frac{180}{987,5}$	$\frac{35,2}{—}$	11,48	165,8
7148-7151	2278	1136	2828	205	1544	$\frac{36}{74,8}$	$\frac{3504}{650}$	—	Следы	203,6
7584-7587	1308	142	858	125	1648,5	$\frac{150}{936}$	$\frac{3360}{750}$	$\frac{281,6}{750}$	6,65	119,2

Note: The units for the composition of gas extracted from the core are cm<sup>3</sup>/kg.10<sup>-4</sup>.

Key:

- |                           |             |
|---------------------------|-------------|
| 1. Core sampling depth, m | 3. At 500°C |
| 2. At 300°C               | 4. Traces   |

The Sarmat deposits are represented by fine-grained calcareous sandstone with a low organic matter concentration (0.01 percent) and an extremely low concentration of bituminous substances (0.000 n percent). Gas saturation of hydrocarbon substances is insignificant--0.85 cm<sup>3</sup>/kg. The proportion of CH<sub>4</sub> in hydrocarbon gases is 91.54 percent.

Upper Cretaceous deposits are represented by pure varieties of organogenic-fragmentary limestone, with practically no terrigenous impurities.

Concentration of sorbed hydrocarbon gases in limestone varies within small limits--2.1-5.31 cm<sup>3</sup>/kg, and their composition does not experience great changes, with the concentration of CH<sub>4</sub> being 83.8-87.3 cm<sup>3</sup>/kg; all methane homologues up to hexane inclusively were detected, and the  $\frac{i-C_4H_{10}}{n-C_4H_{10}}$  ratios vary from 0.89 to 2.33 (usually 1.2-1.3); the C<sub>n</sub>H<sub>2n+2</sub> concentration is 0.5-0.15 percent.

The Mesozoic volcanogenic bed, which is represented by rock from volcanoclastic, lava and subvolcanic facies of an andesite-basalt formation, was studied by the thermal degassing method (tables 2,3).

The dominant component in the gas phase of rock is carbon dioxide, the concentration of which varies from 119.2 to 855.5 cm<sup>3</sup>/kg. No definite law is observed in the change in CO<sub>2</sub> concentration with depth or depending on the type of rock. The concentration of nitrogen in the analyzed samples varies from traces to 149.9 cm<sup>3</sup>/kg. No laws of any sort were discovered in the change in N<sub>2</sub> along the section or depending on the type of rock.

Hydrocarbon gases are present in insignificant quantities in volcanogenic rock-- $n \cdot 10^{-3}$  cm<sup>3</sup>/kg. Methane dominates the hydrocarbon gas composition.

### Conclusions

The chemical composition of gases in both sedimentary rock and volcanic rock is dominated by nitrogen with carbon dioxide secondary, and more rarely by carbon dioxide, with nitrogen secondary; the concentration of hydrocarbon gases is insignificant.

On the whole the degree of saturation of the section by hydrocarbon gases exhibits a tendency to increase with depth.

Gases in the larger part of the section of sedimentary rock are syngenetic. Their composition and the nature of the organic matter ("dry" gas composition, a few bituminous substances) suggest that gas formation processes of insignificant intensity had run themselves out.

Hydrocarbon gases in volcanic rock (degassing temperature, 200°C) are characterized by a preponderance of methane and, in a number of cases, unsaturated hydrocarbons.

No definite law of change with respect to cross section or depending on type of rock is noted for the composition of gases in volcanic rock within the analyzed portion of the section.

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## OIL AND GAS

### OIL WELL REPAIRMEN UNABLE TO OBTAIN RELIABLE HOISTS

Baku VYSHKA in Russian 10 Oct 84 p 3

[Article by N. Aliyev, chief, production division for underground repair and overhaul of wells of the Azneft' Association, and Kh. Yarulin, the division's senior engineer: "Dependable Equipment for Repairmen"]

[Text] Each year wells on fields of the Azneft' Association are subjected to overhauls and current repairs up to 100,000 times. Each day 250-300 wells with a mean daily flow of 300-350 tons of oil are reconditioned. This makes obvious the decisive significance a well-organized repair effort has to fulfilling oil extraction plans, and the great importance of bringing this service up to the forefront of scientific-technical progress and equipping repairmen with highly mechanized machine units and dependable tools for repairing wells.

The December 1983 Plenum of the Azerbaijan Communist Party Central Committee, which discussed the tasks of Azerbaijan's party organization associated with fulfilling the CPSU Central Committee and USSR Council of Ministers decree "On Measures to Accelerate Scientific-Technical Progress in the National Economy," subjected the Azneft' Association to valid criticism for poor participation in the effort to introduce new equipment and emphasized the fact that its plans always contained the same measures, ones which were distinguished by neither novelty nor a high economic return. We, the engineers, have no right to stand passively aside in this matter. There are very many problems today in supplying repairmen with modern equipment. Some of the worst are discussed below.

Seventy-five percent of Azneft' wells are equipped with derricks and "eklipsy" [eclipses--not further identified] that for the most part have been operating a quarter of a century, even though their life is supposed to be 12 years. Moreover, the eclipses and derricks as well as the gear mounted on them--crownblocks, traveling blocks, hooks and steel cables--are utilized to only 5 or 6 percent of their capacity per year. Therefore the equipment rusts and falls into disuse. Were we to use the life of permanent structures as our reference point, then we would have to replace 6,000 derricks and eclipses belonging to the Azneft' Association today, together with the equipment installed on them. But because of the sizable capital investments, it is unprofitable to do so. So what can be done?



There is one solution: We need to convert the wells to derrick-free maintenance. The December Plenum of the Azerbaijan Communist Party Central Committee made direct reference to the need for hastening introduction of this progressive method. Derrick-free well operation would make it possible to raise the excellence of production, improve the environment and, most importantly, create the best conditions for more-productive use of equipment.

The issue of converting the wells to derrick-free maintenance was discussed many times at conferences and debated in the republic's newspapers. But the conversion is proceeding extremely slowly. Within a year 80-100 wells are converted to the progressive method, while the rate that is required is 4 to 5 times higher. And even if this higher rate were maintained, the work would not be completely finished until the end of the 12th Five-Year Plan.

This situation came into being not because Azneft' opposes innovation. The problem is that the repairmen do not have a sufficient quantity of self-powered hoisting equipment. Eighty-seven percent of the wells drilled on land are up to 1,000 meters deep and located in old, poorly equipped fields. And this means that over half of the total volume of repairs involves raising rods and replacing submersible pumps. Therefore conversion to derrick-free maintenance of such wells requires highly maneuverable self-powered hoists of basically low loading capacity (up to 25 tons). But such machine units are unavailable today, because our oil field machine building plants do not build them.

It is true that specialists of the AzINMash [Azerbaijan Scientific Research Institute of Petroleum Machinery] did design such machine units but the interdepartmental commission did not accept their development. Therefore our republic's oilmen who are compelled to use huge hoists with a high loading capacity but poor maneuverability to repair small wells not equipped with derricks and eclipses. All of this delayed conversion of wells to derrick-free maintenance.

The Bakinets-3M hoist (riding on a T-100 tractor chassis), which was produced for a period of 12 years by the Machine Building Plant imeni Leytenant Shmidt, was best suited to our conditions. The association now possesses 127 of such hoists. But their technical condition leaves something to be desired.

Our woes began in 1982, when the Machine Building Plant imeni Leytenant Shmidt stopped producing these hoists and spare parts for them. To replace them, they assimilated production of 50-ton UPT-1-50 hoists intended for well over-haul; frankly speaking, they are inferior to their predecessors in many ways.

The AzINMash developed the UPT-32 hoist for underground repairs; the Kishlinskiy Machine Building Plant did not begin producing these hoists until 1984. Thus production of the old hoists (Bakinets-3M, AzINMash-43A) was halted before production of the new hoists was fully under way; thus the machine builders and AzINMash placed the repairmen in a difficult situation. Judge for yourself: While the Azneft' Association used to receive 40-45 new hoists every year, in the last two and a half years it received only 12 (primarily the UPT-1-50).

The situation is aggravated also by the fact that it is impossible to keep the existing fleet of Bakinets-3M hoists in serviceable condition because of the lack of spare parts. The situation is particularly bad with the Ordzhonikidzeneft', Shirvanneft' and Sal'yanyneft' petroleum and gas extraction administrations, where the bulk of the association's oil extraction is concentrated.

It should be noted that in the last few years the quality of specialized equipment produced by machine building plants of the Soyuzneftemash All-Union Production Association for repairmen worsened dramatically. In our opinion the main reason for this is frequent change of the design of hoists and hoisting units. As an example in the last few years the Kishlinskiy Machine Building Plant changed the design of its hoists three times jointly with the AzINMash. First there was the LT-11-KM, which was replaced by the AzINMash-431 riding on a T-100 tractor chassis, and in 1980 this hoist began to be manufactured on tractors of higher power. And production of a completely new hoist, the LPT-8, was started in the fourth quarter of 1982.

The same picture is observed with production of hoisting units. Designers and developers are supposed to be insuring a high technical level of production, and recommending assimilation of fundamentally new machinery and equipment of greater productivity and longer life. But the problem is precisely that the new hoists and hoisting units are inferior in many ways to the old models. For example hoists of the 1950s, which represented 20 percent of the total machinery pool, are still serviceable today, while the new models are distinguished by neither convenience nor reliability.

Repairmen are displeased with the LPT-8 hoist and the UPT-1-50 hoisting unit designed by the AzINMash. Experience showed that LPT-8 hoists often break down due to the gear box, the universal shaft, the compressor drive and other causes. It also contains some design deficiencies. It would be sufficient to say that complaints citing poor quality were drawn up on nine out of the 22 hoists of this type received in 1982-1983. And how are things going today? In 7 months of 1984 seven LPT-8 hoists broke down while still in their warranty period at the NGDU [Petroleum and Gas Extraction Administration] imeni 20 Arkinskiy Komissary. And out of six LPT-8 hoists obtained by the Kirovneft' WPP in the second quarter, four have still not been placed into operation due to plant defects. Nor are things any better with UPT-1-50 hoisting units belonging to the Plant imeni Leytenant Shmidt. All 10 UPT-1-50 units obtained by the association contained plant defects.

As a rule hoists and hoisting units supplied by plants of the Soyuzneftemash All-Union Production Association cannot be placed into operation before some final work is done on them locally. Moreover it has now been several years that the repairmen themselves have been building trailers for AzINMash-431 hoists because for some reason the Kishlinskiy Machine Building Plant does not find it necessary to manufacture them itself. This is despite the fact that the plant's technical control service is known to be bound to monitor quality and the completeness of equipment delivery.

But it is evident that the technical control office of the Kishlinskiy Plant is trying to avoid the issue. What other explanation can there be for the

fact that UPT-3 hoists have so many defects? Thus the gear shift on hoist No 73 does not work, gear teeth on hoist No 132 are broken, and a metal object was discovered in the transfer case of No 135. And so on. Malfunctions revealed at the oil fields had to be corrected by the repairmen. As far as existing units are concerned, underground repair brigades of Azneft' did not receive any this year. The problem is that the Bakinets-3M units are no longer in production, the UPT-1-30 is almost impossible to use in our conditions, and production of the new UPT-32 is still in its preparatory stage. This is what things are like right now. But we will not be able to count on getting good, fundamentally new equipment tomorrow either.

We believe the reason for this to be in the fact that specialists of the AINMash do not always consider the opinions and requests of the oilmen in their developments. Hence the serious shortcomings. As an example this Institute's Department No 4 developed a new block and tackle system with loading capacities of 12.5, 20, 32 and 50 tons. But it is much greater in weight and overall dimensions than its predecessor. One wonders what sort of information was used as the basis for creating a block and tackle system with loading capacities of 20 and 32 tons when the eklipsy installed at the oil fields have loading capacities of 15 and 25 tons? Quite understandably, the interdepartmental commission would not give the "go-ahead" for production of this new item. And the developers make many such mistakes. It would be sufficient to point out that an inspection commission of the State Committee for Supervision of Industrial Safety and for Mining Inspection prohibited the use of KrSh-10 rod hooks (in July 1957), while in April of this year the commission rejected the UPA-32 owing to serious shortcomings.

Successful petroleum extraction without development of technical progress would be unimaginable. It is the duty of designers and machine builders to raise the return on their scientific developments and to design and produce dependable, highly productive equipment for oilmen faster. They must base their effort on what the CPSU Central Committee and USSR Council of Ministers decreed: Fulfillment of plans and quotas concerned with development of science and technology must now be included among the most important indicators on the basis of which the results of economic activity are assessed and the results of socialist competition are summarized.

11004

CSO: 1921/57

## OIL AND GAS

### NEW WATER INJECTION PROCEDURE FOUND EFFECTIVE

Alma-Ata KAZAKHSTANSKAYA PRAVDA in Russian 12 Oct 84 p 4

[Article by Yu. Baydikov, chief of technical control, member of the governing board of the USSR Ministry of Petroleum Industry: "Effective Technology"]

[Text] The problem of extracting oil from beds is becoming increasingly more important and difficult. In recent years the current oil output has been decreasing, since deposits in which the geological structure of the reservoirs is more complex are being developed. Oil of greater viscosity and containing paraffin, asphalt-tar and sulfur compounds is concentrated in these reservoirs. The depth at which hydrocarbon deposits lie, reservoir pressure and temperature are increasing significantly. These and other features naturally make development of the deposits more complicated. Extraction of this oil using the traditional methods of affecting productive beds by flooding are becoming increasingly less effective.

Deposits characterized by geological structure and oil properties noted above were discovered in the last 2 decades, and now they are being placed under development in a number of the country's regions, including on Mangyshlak and Buzachi peninsulas in western Kazakhstan. Unique in their structure, the Uzen, Zhetybay, Karamandybas and other deposits are of special interest. One would think that the Uzen deposit has been studied sufficiently fully in geological and technological respects, since it has been under exploitation since 1965, and much information has been accumulated on it. But the longer scientists of the scientific research institutes and the producers work here, the more new problems arise.

It can be said today that the initial thermodynamic conditions for developing the oil formations in the Uzen deposit are not being violated. Sea water heated to 80° has been pumped into the productive horizons of the Uzen deposit in the Mangyshlak Desert since the beginning of last year in order to maintain reservoir pressure and temperature. Cooling of oil-saturated beds, especially thin ones with low permeability, and loss of paraffin from them has been excluded. This means that plugging of pores in the rock is excluded as well. Oil is being driven to producing wells unhindered. Consequently the amount of useful mineral extracted is increasing.

Most oil extracting countries of the world have been conducting intensive theoretical, laboratory and oil field research in the last 5-10 years associated

with creating and introducing new methods of raising the oil output of the beds. Various experimental industrial projects have also been planned for the Uzen deposit. Of all of the methods presently employed, a new production process called stepped thermal flooding was found to be the most effective.

This process was tested successfully in the field, it was accepted by a departmental commission of the USSR Ministry of Petroleum Industry, and it was introduced on a major scale at a selected site.

The new flooding system was created and implemented in an extremely short period of time. Over 60 new wells had to be drilled, water pipes capable of withstanding pressures of 100 and 150 atmospheres had to be laid to the new series of injection wells, several dozen producing wells had to be modified for injection, modular pumping station clusters and water distributing points had to be built, water lines had to be laid from them to the injection wells, the latter had to be equipped, and exclusively hot (thermal) water had to be supplied. All of these and other operations associated with setting up the new flooding system and insuring its reliability had to be carried out at oil fields covered by underground and above-ground utility lines. This made it significantly more difficult than it would be to do the same operations on new territory.

The resulting impact is very impressive. As a result of wide introduction of the new procedure of affecting abnormal oil formations in the Uzen deposit, about a million and a half extra tons of oil were extracted in 1979-1983 directly from the oil fields. Moreover over 800,000 tons of oil were extracted from areas contiguous with the oil fields. The economic effectiveness was estimated at 65 million rubles.

The new procedure for increasing the oil output of beds created by scientists of the All-Union Petroleum and Gas Scientific Research Institute jointly with producers of the Mangyshlakneft' Association was successfully introduced at oil fields of Mangyshlak. It will also enjoy wide application at the country's other deposits.

11004

CSO: 1822/37



## OIL AND GAS

### HISTORY, FUTURE OF URENGOY GAS SUMMARIZED

Kiev PRAVDA UKRAINY in Russian 28 Aug 84 p 1

[Interview with I. S. Nikonenko, director, Urengoygazdobycha Production Association, by A. Zholudenko: "Dictated by the Strategy of Assimilation"]

[Text] Urengoy. This word, which is known today to all the world, has become a symbol of the courage and steadfastness of the Soviet people, who created the country's main gas extraction base in uninhabited regions of West Siberia in very short time. This unique deposit is already playing an enormous role in implementing the Energy Program. And yet this is only the beginning, with even more impressive prospects ahead. USSR State Prize Laureate I. S. Nikonenko, director of the Urengoygazdobycha Production Association imeni S. A. Orudzhev, tells our correspondent what has been achieved and what direction development of the gas condensate complex in northern Tyumen Oblast will take.

[Question] Ivan Spiridonovich, your road to Urengoy had its beginning in 1966, when you arrived at the West Siberian gas fields after working in the Ukraine. It was precisely in that year that the presently famous deposit was discovered. Tell us how its subjugation was unique.

[Answer] Before Urengoy, we had never had to develop a deposit located far away from industrially developed regions, in the uninhabited tundra by the Arctic Circle. The complex geological conditions of the region, impassable swamps, mosquitoes and biting flies in summer, intense frost and wind in winter, and the complete absence of any sort of transportation network posed highly complex tasks before the builders and gas producers. Under these conditions we had to get Urengoy gas flowing to the country as quickly as possible.

We knew that we would not be able to reach the riches of the northern subsoil quickly by the old methods: The traditional chain of development was too long. It would have taken many years to explore, examine and confirm the reserves completely, to draw up the procedures for developing, equipping and drilling the deposit, and finally to achieve industrial extraction. Therefore a decision was made to carry out all of the work simultaneously, and to

proceed with the construction at a rate several times faster than usual. How was this to be done?

By the time we began developing Urengoy, we had already accumulated the experience of working in the Tyumen north. But this experience turned out to be insufficient, since Urengoy differed so much in its parameters from other natural storehouses. There was but one thing left to do--to generalize all of the experience of the practical workers, to recruit the help of science and to seek nonstandard and most effective solutions by joint effort.

[Question] The issue is clear from the aspect of the practical workers, but as far as science is concerned, it seems to me that there are refinements to be made. After all, no research has ever been conducted on such problems either here in our country or abroad.

[Answer] Urengoy became a unique proving ground on which the boldest engineering, technical and organizational concepts were tested. The modular construction method and cluster drilling of large-diameter wells, which are now widely employed, got their start here, integrated production teams proved themselves well in construction of gas pipelines, and much new technology owes its existence to the effort to fit out the Tyumen north.

Ukrainian scientists made a major contribution to Urengoy's development. Scientists from the Electric Welding Institute imeni Ye. O. Paton of the Ukrainian SSR Academy of Sciences developed and designed the Sever and Styk-1 welding complexes especially for northern routes. Their use saves much time, releases a large number of qualified welders and produces a tangible economic impact. Specialists of the Donetsk YuzhNILgiprogaz [not further identified] Institute planned the famous Urengoy-Pomary-Uzhgorod transcontinental mainline. A large number of interesting developments were proposed by other scientific and planning collectives of the republic.

[Question] We have gotten somewhat ahead of ourselves here, all of this happened later, but what was it like in the beginning?

[Answer] In the beginning it was very difficult. Nonetheless the enthusiasm of the people and their insurmountable desire to conquer this harsh land became a powerful impetus in the first stage. Owing to the selfless labor of thousands of pioneers who came here from all corners of the country, including from the Ukraine, by as early as on 22 April 1978 the first integrated gas preparation facility was started up. This is the way the workers of Urengoy marked that anniversary of V. I. Lenin's birth. In a very little while after that the first billion cubic meters of Urengoy gas were fed into the main gas pipeline. A year later the third and fourth facilities joined those already in operation. Urengoy gathered momentum.

The contribution made by the Ukrainian SSR to the common depository was one of the most significant. And this is understandable. The republic accumulated rich experience in gas extraction, and it is now generously sharing it, sending specialists that had been trained in its institutions of higher education and practical workers who had taken their schooling at Shebelinka, Danyays and other deposits.

Equipment comes to us from all corners of the motherland. Metallurgists send us piping from mills on the Dniepr--from Nikopol, Dnepropetrovsk and Zhdanov. We have equipment produced by Kharkov machine builders, and instruments and equipment manufactured at enterprises in Kiev, Zaporozhye, Donetsk and other Ukrainian cities. But this far from exhausts the contribution made by the republic.

Lvov geologists are now conducting the final prospecting of the deposit. The collective of a deep drilling expedition of the Krestishchenskiy Drilling Operations Administration is working excellently. Kharkov drillers are making their way toward gas condensate, and all projects are being carried on significantly ahead of schedule. This will make it possible for gas producers to begin providing the country with "white oil" in the very near future. Thus yet another step forward in realizing a most important objective--integrated development of the deposit and maximally effective utilization of its subsoil, which is rich not only in gas but also in condensate--is being taken with the help of Ukrainian specialists.

[Question] What is Urengoy like today?

[Answer] It seems as if the torch towering over the first integrated gas preparation facility began burning just recently and just 6 years later, on the eve of Oil and Gas Industry Workers' Day, we reported that 100 million cubic meters of gas had been extracted from the deposit.

Today 11 gas preparation facilities are operating at the deposit. The last went into operation just 2 months ago, and it will soon reach its planned output capacity. The condensate extraction plan for the first half year was completed successfully. Eighty-seven new gas wells were put into operation. During this same period of time our association raised labor productivity by 2.1 percent and decreased product cost by 2 percent.

As in former times, we still devote considerable attention to developing the infrastructure, to solving social problems. Over 55,000 square meters of housing space, new stores, a children's polyclinic, a pharmacy, an infant feeding center and other facilities were placed into operation this year. Nonetheless not all of the problems have been solved yet. We still have much work to do to achieve fuller satisfaction of the demands of northerners.

That is how we are living and working. I would like to say in conclusion that ambassadors from the Ukraine are rightfully proud of the accomplishments of Urengoy.

11004  
CSO: 1822/37

## OIL AND GAS

### BRIEFS

OIL PRODUCTION UP--Ali-Bayramly (Azerinform)--Laborers of the Shirvanneft' Petroleum and Gas Extraction Administration's Shop No 1 servicing the Severnyy Kyurovdag deposit doubled the output of well No 931. This was the result of installing a more-productive electric submersible pump at the facility, the trouble-free operation of which guarantees oilmen 20 extra tons of "black gold" each day. The shop's geologists and operators are finding many possibilities for increasing the flow of oil from the interior. Thus one of the wells was moved to a higher horizon of the productive bed. Once again this resulted in acquisition of more oil--30 more tons per day; moreover this well turned out to be a gusher. Gushing wells are no rarity today at the old Shirvana deposit. The best example of long life is well No 775, which has been filling the shop's oil tanks with a heavy flow of fuel for 6 years. Led by experienced masters of oil extraction, all five of the collective's brigades are working amicably and cooperatively in September. Their contribution to the administration's oil bank is steadily growing. [Text] [Baku VYSHKA in Russian 26 Sep 84 p 2] 11004

NEW OFFSHORE WELLS--Baku--A new well 4,666 meters deep is pumping about 40 tons of oil and 20,000 cubic meters of gas each day into tanks of the NGDU [Petroleum and Gas Extraction Administration] imeni Serebrovskiy. It was drilled at the Bakhar deposit by a brigade from the Bukhta Il'icha Offshore Exploratory Drilling Administration, headed by drilling chief G. Nazarov and foremen S. Ismailov and F. Aliyev. Competently utilizing the best well drilling equipment and procedures, the drillers are already working on their fourth month into the final year of the five-year plan. Since the beginning of the five-year plan they drilled through 10,630 meters of rock in the bottom of the Caspian, to include the ultradeep well No 568 at a site on Bulla Island. This well joined the active fund of the NGDU imeni Narimanov, and it is now producing a sizable quantity of "black gold." The following brigade members distinguished themselves especially in the course of construction of these two wells: drillers V. Tikhonov, N. Mamedov, G. Gadymov and A. Daniel'yan, their assistants M. Gasanov and S. Mokhov, fitter A. Shakhverdov and others who are systematically fulfilling their shift quota by 110-115 percent. Responding objectively to appeals of the CPSU Central Committee concerning the 67th anniversary of Great October, the leading collective pledged to begin drilling a new well by this noteworthy date from a permanent offshore platform at the deposit imeni 28 April', where preparations for drilling are now under way. The brigade decided to finish its five-year plan by the 40th anniversary of the Soviet people's victory in the Great Patriotic War. [By N. Mushailov] [Text] [Baku VYSHKA in Russian 16 Oct 84 p 1] 11004

**WELL DRILLERS INCREASE PACE--**Ali-Bayramly (Azerinform)--Completion of the full cycle of construction of two new wells made it possible to increase the daily output of Shirvana oil deposits by 50 tons per day. Credit for this event belongs to brigades led by Khalaf Buniyatov and Azhdar Nasirov, whose collectives are in the lead in the pre-October competition in the Ali-Bayramly Drilling Operations Administration. Another three new facilities that became operational provided oilmen with a substantial increment of "black gold." Following the recommendation of geologists, these wells were converted to subsurface pumping. The rate of drilling and construction of new wells was increased at the old deposits of the Kura lowlands in order to stabilize and increase extraction of liquid fuel. Owing to this, over 20,000 additional tons of oil have been obtained. [Text] [Baku VYSHKA in Russian 16 Oct 84 p 1] 11004

**OIL WORKERS SURPASS QUOTAS--**Oilmen of the NGDU imeni Bakinskiye Komissary got a good head start for successful work in the fourth quarter. In 9 months they surpassed the extraction plan by over 1,200 tons of oil and about a million cubic meters of gas. The oilmen found reserves for raising labor productivity in greater labor discipline and wider use of technical innovations and secondary oil extraction methods. The collective of Shop No 2 is among the best in the administration. The oilmen are working in close contact with scientists and specialists of the AzNIFineft' [not further identified] Institute and the Institute of Deep Petroleum and Gas Deposits of the Azerbaijan SSR Academy of Sciences. This creative cooperation is producing substantial fruits, and it is making it possible to widely introduce new equipment and procedures adapted to the conditions of the oil field. Nor are the repairmen lagging behind the producers. In three quarters they performed dozens of repairs in excess of their quotas, and they reduced the inactive list by more than 300 wells, which are now supplying oil without breakdowns. [Text] [Baku VYSHKA in Russian 2 Oct 84 p 1] 11004

**GAS QUOTA SURPASSED--**Laborers of the Azizbekovneft' NGDU are increasing raw material extraction from one month to the next. Having turned over 6 million cubic meters of gas in excess of the plan over to processing, the members of this leading collective surpassed their socialist pledges by almost a factor of 10. "In its appeals for the 67th anniversary of the Great October Socialist Revolution, our party's Central Committee emphasized the importance of increasing oil and gas extraction," said the administration's chief engineer, Kh. Khankishiyev. "Fulfilling this great and important task, we are widely introducing advanced work methods and drilling new wells. Two of them went into operation this year, and they are providing a thousand cubic meters of gas each day." [Text] [Baku VYSHKA in Russian 13 Oct 84 p 1] 11004

**THREE-BILLIONTH TON--**Tyumen (TASS)--The three-billionth ton of oil has been extracted from oil fields of Tyumen Oblast. This is the first time such a quantity of valuable raw material was obtained from deposits of a single oil extracting region. It required oilmen a total of about 3 years to extract their third-billionth ton of oil. The first was extracted in the fifteenth year of development of the Siberian deposits. The accomplishments are indubitable. But growing pains have also made themselves known: After all, the oil fields have spread far from the production bases and transportation arteries, into deposits of complex geological structure. But the potential accumulated by the labor collectives and the available resources of petroleum



industry permit the assertion that compensation will be made for the year's failed oil extraction quotas. The oblast party organizations and the collectives of oil workers are working on this problem. Tyumen oil fields will provide the country with more billions of tons of valuable raw material. [Excerpts] [Baku VYSHKA in Russian 28 Sep 84 p 1] 11004

GAS LIFT RAISES OUTPUT--Oilmen of the NGDU imeni N. Narimanov are working successfully in the fourth year of the five-year plan. Despite the frequent storms which typify the Caspian, they extracted over 15,000 tons of oil above plan. The principal method of obtaining crude in the administration is gas lift. That is, gas is pumped into the subsoil, which then forces liquid fuel to the surface. The oilmen are constantly improving extraction technology. Improved gas lift valves were introduced at two oil fields. They made it possible to significantly increase well output. Conversion of wells to exploitation of lower-lying productive horizons and use of pipe anticlogging reagents developed by Azerbaijani scientists are producing good results. [Excerpts] [Baku VYSHKA in Russian 28 Sep 84 p 1] 11004

KUYBYSHEV OIL QUOTA SURPASSED--Kuybyshev--Having extracted over 150,000 tons of fuel in excess of the plan since the beginning of the year, Kuybyshev oilmen surpassed their socialist pledges 200 percent. The successful work of the collective of Kuybyshevneft' is promoted in many ways by geologists, who discovered 10 new storehouses of "black gold" in the last year. [By A. Vorob'yev] [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 13 Sep 84 p 1] 11004

EXPLORATORY OFFSHORE WELL PRODUCES--A heavy flow of oil has been obtained from exploratory well No 14, which was successfully drilled by the collective of a floating semisubmerged drilling rig of Kaspormorneft', headed by V. Vekilov and drilling foremen M. Gasanov and T. Teymurov. It should be noted that a new well was drilled on the northeastern wing of the deposit imeni 28 April', where the water depth exceeds 150 meters. The obtained data permit initiation of the planning of permanent platforms intended for drilling producing wells in the new deep-water section of the deposit. [By A. Nuriyev, inspector, Azerbaijan SSR State Committee for Supervision of Industrial Safety and for Mining Inspection] [Text] [Baku VYSHKA in Russian 9 Oct 84 p 1] 11004

ARCTIC OIL DEPOSITS DISCOVERED--Usinsk, Komi ASSR--Geologists and prospectors of the Usinsk oil prospecting expedition created a good foundation for raising oil and gas extraction in the Arctic. They revealed five new deposits. Their proximity to the region that has already been developed by oilmen will make it possible to achieve their industrial development quickly. [Text] [Baku VYSHKA in Russian 21 Sep 84 p 1] 11004

GAS COOLING UNIT TESTED--Tyumen, 27 [Aug]--Tests have begun on an experimental industrial gas cooling unit at Urengoy--a huge gas condensate deposit. It was installed on the main extending from northern Tyumen Oblast through Pomary to Uzhgorod. One would question why it would be necessary to cool natural gas here at the Arctic Circle, in the land of permafrost. For the sake of the well-being of this permafrost, we find. The problem is that the pipe through which the blue fuel erupts from deep in the interior is too hot to touch. And this gas remains just as hot when it enters the underground mains after

appropriate purification. When it thaws, permafrost has the "habit" of pushing foreign bodies up to the surface. This has often resulted in damage to the pipelines. Experimental operation will make it possible to determine what type of machinery is the most effective in the local conditions. Cooling of the gas will increase the reliability of the pipeline systems. [By V. Lisin] [Text] [Moscow PRAVDA in Russian 28 Aug 84 p 3] 11004

NEW YAMALO-NENETS OIL DEPOSIT--Tyumen, 3 [Sep]--Tyumen geologists discovered a new oil deposit in the Yamalo-Nenets Autonomous Okrug. A huge gusher of oily fluid was obtained from Lower Cretaceous deposits. The proximity of this new addition to the Surgut-Novyy Urengoy railroad and to the presently operational Muravlenkovskoye deposit is making it possible to organize extraction of "black gold" here in shorter time and with lower outlays. The underground storehouse was named the Barsukovskoye deposit in honor of A. S. Barsukov, one of the pioneers who invested much labor and effort into development of the untouched oil deposits of Tyumen Oblast. [By V. Lisin] [Text] [Moscow PRAVDA in Russian 4 Sep 84 p 1] 11004

GAS WELL PRODUCES--Astrakhan--Well No 58 produced its first gas at the Astrakhan gas condensate deposit. It was built with high quality by the collective of V. K. Tokmidov's brigade from the Astrakhan'gasprom Production Association's Aksarayskiy Drilling Operations Administration No 1. Specialists and laboratory technicians are presently studying the well's output and analyzing the chemical composition of its gas and condensate. [Text] [Moscow SEL'SKAYA ZHIZN' in Russian 15 Sep 84 p 1] 11004

PETROLEUM, GAS PRODUCTION FIGURES--Implementing the USSR's long-range Energy Program, gas producers and oilmen of Uzbekistan are marking their professional holiday with a shock effort to fulfill the five-year plan. Having initiated a major socialist competition for an honorable welcome to the 60th anniversary of the Uzbek SSR and the Communist Party of Uzbekistan, just since the beginning of this year they surpassed the extraction plan by 20,000 tons of oil, over 200 million cubic meters of gas and 26,000 tons of gas condensate.

Collectives of the Andizhan and Gazliyskiy petroleum and gas extraction administrations and the Mubarek Gas Refinery are marching in the vanguard of the workers' competition. [Excerpt] [Tashkent PRAVDA VOZROD in Russian 1 Sep 84 p 1] 11004

UNDERGROUND GAS MAIN--Orenburg (TASS)--Preparations have begun for testing the large-diameter gas pipeline connecting the Orenburggazprom Association to Karachaganak, a new gas condensate deposit in Kazakhstan. The underground main, which stretches 130 kilometers through the steppes and crosses five rivers, including the Ural and Ilel, was finished by the builders precisely on schedule. The first crude gas will begin to flow from the deposit to the Orenburg gas complex for refining as early as in October, as was indicated in the pledges. [Excerpts] [Moscow PRAVDA in Russian 24 Sep 84 p 1] 11004

**NEW VOLGOGRAD OIL DEPOSIT--**Volgograd--Volkograd specialists were certain that well No 16 would confirm their prediction about the promise offered by the new Nizhne-Korobkovskoye oil deposit. And they were not wrong. High quality oil flowed from a depth of 2,500 m. One hundred tons per day--such is the output of this well. The new deposit is north of Volgograd, next to a railroad, a highway, an oil pipeline and active oil fields. Volgograd oil was obtained here for the first time soon after the war. The oilmen remember this as they think about the future. There are hopes of initiation of exploitation of the new area as early as in next year, said the chief geologist of the Nizhnevolzhskneft' Association, K. Anisimov. [By Yu. Kas'paryan] [Moscow] [Moscow IZVESTIYA in Russian 24 Sep 84 p 1] 11004

**OILFIELD PRODUCTION AUTOMATION--**All fields of the Ordzhonikidzeneft' NGDU [Oil and Gas Production Administration] have become fully automated following adoption of an automatic oil production control system, which has radically changed the field operator's job. Now they no longer need to make rounds of the wells in fair weather and foul, to take flow readings and determine whether well regime is optimal. Dispatcher stations are operating in each oil and gas production shop. Here the operator can obtain data on the operation of every well, without leaving the control console. All he has to do is connect a well to the sensors with a simple flip of a switch. Control of the oil production process has become immediate, operators have begun taking readings more frequently, and therefore determine deviations in well operation more quickly. Automation has also improved the quality of the custody-transferred crude. Now automatic sensors in special tanks monitor how well water and mechanical impurities are being removed from the oil, and only after this permit it to be pumped into the stock tank. Improvement of working conditions for oilfield workers through automation is one of the most important points in the enterprise social development program adopted by the NGDU. [Text] [Baku VYSHKA in Russian 17 Jul 84 p 2] 3024

**NEW PIPELINE WRAPPING MATERIAL--**A new wrapping material called plastobit has successfully passed a durability test conducted by the Turkmen Trunk Oil Pipeline Administration. It was used to wrap a 45-kilometer stretch of the Kotur-Tepe - Krasnovodsk oil pipeline. This plastic wrap improved the pipeline's throughput capacity and has saved approximately 30,000 rubles in pipeline operating costs. This new innovation was proposed by specialists at the All-Union Scientific Research Institute for Oil Gathering, Treatment, and Transfer. On their recommendation the old asphalt-base and rubber coating and wrapping material began to be treated with synthetic resins and polymers. Plastobit extends a pipeline's service life by a factor of 5-6. [By Z. Rzayev] [Text] [Ashkhabad TURKMENSKAYA ISKRA in Russian 15 Jul 84 p 2] 3024

**ALI-BAYRAMLY DRILLERS--**A drilling crew from the Ali-Bayramly Drilling Operations Administration headed by experienced foreman Mustafa Mustafayev is performing shock-work labor. Since the beginning of the fourth year of the five-year plan this vanguard crew has drilled 1,320 meters, much more than the plan-specified target. These drillers are currently putting down Well No 1200, with a planned depth of 1,680 meters. It is now ready to put in the

intermediate casing string. A considerable role in the crew's accomplishments has been played by employment of an advanced method of organization of labor -- the brigade contract. It promotes better utilization of existing reserve potential and helps improve labor and production discipline as well as efficient utilization of equipment. Mustafayev's crew [brigade] has set for itself the goal of refusing to rest on its laurels, to continue adopting technical innovations, advanced know-how, and consolidating past accomplishments. The crew has pledged to turn Well No 1221 over to the production operators ahead of schedule and is successfully accomplishing this task. [By A. Babayev, retired oilman] [Text] [Baku VYSHKA in Russian 15 Jul 84 p 1] 3024

**AUTOWELDER PREPS DRILLPIPE**--A general-purpose automatic welding machine designed at the All-Union Pipe Scientific Research Institute has been upgraded by innovators at the Turkmenneft' Association's pipe and tool depot and has already been put to practical use. With the aid of this machine they have improved preparation of drillpipe. For example, application of the threads has been replaced by a box-and-pin connection weld. The improved machine has made it possible to replace a large percentage of manual labor in the pipe joint preparation and drilling process, increasing labor productivity. [By Z. Rzayev] [Text] [Ashkhabad TURKMENSKAYA ISKRA in Russian 17 Jul 84 p 2] 3024

**OFFSHORE DRILLING TUGS**--Yuzhno-Sakhalinsk--The powerful seagoing tugs "Neftegaz-6" and "Neftegaz-28," built at shipyards in the Polish People's Republic, have completed the trip from the Baltic coast to Sakhalin, across seas and oceans. They have joined the geological exploration fleet of the Far Eastern Offshore Deep-Drilling Oil and Gas Prospecting Field Unit. These special vessels are capable of towing large floating drilling rigs great distances and providing offshore rigs with all necessary supplies. Built with a reinforced hull, these tugs can haul supplies through ice and conduct rescue operations at sea. [Text] [Moscow SEL'SKAYA ZHIZN' in Russian 19 Jun 84 p 1] 3024

**6-MONTH NATURAL GAS TARGET**--Gas industry workers completed ahead of schedule, on 27 June, the 6-month natural gas production target. Above-target gas production for the 6-month period will run 6 billion cubic meters. The labor productivity growth plan-specified target has been considerably overfulfilled, and production cost has been reduced. This country's gas industry workers have pledged to produce this year an additional 1 billion cubic meters of natural gas above and beyond earlier pledges. [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 30 Jun 84 p 1] 3024

**MANGYSHLAK HOT-WATER INJECTION**--Shevchenko, 25 April (TASS)--The oilmen of Mangyshlak have achieved an impressive performance on preholiday labor watch. Today, one week ahead of schedule, they extracted the 50 millionth ton of valuable raw material since the beginning of the five-year plan. 350,000 tons of this total represent above-target production. This is the result of the advanced technique of hot-water flushing of producing formations, which has made it possible to boost flow from depleted wells. Mangyshlakneft' Association innovators quickly set up cluster pumping stations and high-output furnaces operating on casinghead gas. The hot water not only breaks formation pressure but also removes paraffin plugs which impede flow of oil toward the



wellbore. The improvement in well production technology will enable oilfield workers to extract an additional half a million tons of crude by the end of the five-year plan. [Text] [Moscow PRAVDA in Russian 26 Apr 84] 3024

**AZERBAIJAN WELL COMPLETION--(Azerinform)--**A new well drilled in the Southern Kyursanginskoye field by the crew of Sarkhosh Mamedov of the Kyursanginskoye Drilling Operations Administration is now adding to Azerbaijan oil production. This vanguard crew finished drilling the well, about 3,500 meters deep, 2 weeks ahead of schedule; the new well is currently producing up to 80 tons of crude each day. Drilling a new well is always a difficult business. The normal difficulty was further complicated here, however, by the specific features of the oilfield, the formations in which often harbor unpleasant surprises. During the drilling of this well S. Mamedov's crew on several occasions had to plug with a cement slurry cracks forming in the rock, into which the drilling mud was escaping, and they had to combat gas blowouts. The drillers' experience and a high degree of drilling procedures discipline were a guarantee of a successful, breakdown-free job. Completion of this well ahead of schedule brought the drillers closer to accomplishing their pledge -- to complete the five-year plan target in 4 years. Since the beginning of the year they have above-target drilled more than 100 meters. [Text] [Baku VYSHKA in Russian 1 Jul 84 p 1] 3024

**EAST SURGUT FIELD INTO PRODUCTION--Tyumen--**Exploitation of the new East Surgut oilfield has begun. The first regular production wells have been drilled. This is one of the most difficult-access fields in the Tyumen North. It is situated on the floodplain of the Ob and becomes completely flooded in the spring. But the hydraulic excavation engineers came to the aid of the oilmen, delivering dredges, putting down spoil delivery lines, and building up in short order man-made islands for the drilling rigs. Construction of oilfield lines and facilities is proceeding at an accelerated pace. [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 1 Jul 84 p 2] 3024

**CAUCASUS COMPRESSOR STATION--Nevinnomyssk--**One of the largest gas compressor stations in the North Caucasus, capable of moving millions of cubic meters of natural gas every 24 hours, in an automated operation, has come on-line near Nevinnomyssk, on the Novopskov-Aksay-Mozdok natural gas pipeline. The workforce of the Stavropolkhimstroy Trust, which built the compressor station, performed 3.7 million rubles worth of construction work here at an unprecedentedly rapid pace. [By A. Yemtsov] [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 4 Jul 84 p 2] 3024

**GALVANIZED DRILLING WIRE--Volgograd--**A consignment of custom-manufactured high-strength galvanized steel wire has been shipped from Volgograd to a cable plant in Tashkent. It is used in the manufacture of load-carrying geophysical cables 12,000-15,000 meters in length, which oilfield workers use in drilling ultradeep wells. This innovative product was developed by laboratory specialists at the Volgograd Steel Wire and Rope Plant. Manufacture of the galvanized steel wire, which is in great demand, has been set up in one of the young shops, which has been provided with modern equipment. This innovative effort by the wire rope makers has been honored with a silver medal of the



Exhibit of Achievements of the National Economy. [By V. Drobotov] [Text]  
[Moscow SOVETSKAYA ROSSIYA in Russian 24 Jun 84 p 1] 3024

ASTRAKHAN GAS WELL--Astrakhan--The first production well has been drilled in the Astrakhan gas condensate field. The hole reached 4,000 meters yesterday on the drilling rig operated by V. Tokmilov's crew from the Astrakhangazprom Administration -- a producing formation was encountered at this depth. The drilling was completed ahead of schedule. [Text] [Moscow SOVETSKAYA ROSSIYA in Russian 17 May 84 p 1] 3024

ORENBURG GAS PLANT--Orenburg--The gas industry workers of Orenburg Oblast are successfully meeting their pledges for the fourth year of the five-year plan. The workforce of the local natural gas processing plant provided the country with approximately 500 million cubic meters of dry gas and 14,000 tons of sulfur above target for the first five months of the year. Targets pertaining to processing unstable condensate and oil treatment were overfulfilled. Construction of lines and facilities in the large Karachaganak gas field, adjacent to the Orenburg field, is progressing at a rapid pace. The gas produced from this field has a high content of sulfur compounds and other constituents. [By I. Gavrilenko] [Text] [Moscow SEL'SKAYA ZHIZN' in Russian 6 Jul 84 p 1] 3024

URENGOY CRUDE--Tyumen--Workers in the Urengoy gas condensate field have commenced an important phase in comprehensive exploitation of this field. Exploitation of an oil pool has commenced here for the first time. To date Urengoy has been producing natural gas, while geologists were continuing to conduct exploration. The deeper the bit penetrated, the more frequently they would discover new producing formations. At a depth of 3,000 meters, adjacent to the central part of the field, another pool was discovered -- an oil pool. A total of 8 oil wells will be drilled this year in the Urengoy. Construction has begun on a central gathering facility adjacent to the drilling sites. [Text] [Moscow SEL'SKAYA ZHIZN' in Russian 5 Jul 84 p 1] 3024

OIL IN URENGOY--The workers of the Urengoy gas condensate field have begun an important phase of comprehensive exploitation of the field's resources. Exploitation of the field's first oil pool has commenced. [Text] [Moscow EKONOMICHESKAYA GAZETA in Russian No 29, Jul 84 p 3] 3024

CASPIAN DRILLING--The crew of foremen E. Aslanov and T. Bagirov of the Bulla Offshore Exploration Drilling Administration has accomplished its 6-month target ahead of schedule. More than 250 meters has been drilled as above-target pledges. Savings to the state achieved by decreasing the cost per meter drilled exceeded 600,000 rubles. Just since the beginning of the current five-year plan this vanguard crew has drilled approximately 13,000 meters, greatly in excess of its five-year target. Work is also progressing well on rig 53, which is drilling to a depth of 6,300 meters in the Bulla-more area. The fixed-platform rig has already drilled down 4,104 meters. The drilling crew has pledged to complete the well and bring it into production considerably ahead of schedule. [By V. Tikhonov] [Text] [Baku VYSHKA in Russian 29 Jun 84 p 1] 3024

**WELL REVIVAL TECHNIQUE--**Vuktyl, Komi ASSR, 21 Jun--The local gas field administration is making preparations for an unusual experiment. For the first time ever in the Soviet Union, the gas field workers have resolved to "revive" a shut-in development well by running down a second wellbore. It will diverge from the already-drilled vertical wellbore at a depth of 3,000 meters and, pushing on another 400 meters, will reach a producing formation. The well workover crew of foreman N. Vorob'yev will employ a special mobile rig for this operation. The new technique will make it possible at low cost to bring new life to wells out of operation, on the drilling of which considerable money was once spent. The advanced technique for "reviving" depleted production wells which the experts have proposed is of definite interest to the gas field workers of the North. [By PRAVDA stringer A. Kurkov] [Text] [Moscow PRAVDA in Russian 22 Jun 84 p 2] 3024

**BAKU REFINERY INSTALLATION--**Baku--A unique installation operation was successfully accomplished at the Novobakinskiy Oil Refinery imeni Vladimir Il'ich. A second coking chamber weighing 300 tons was raised and placed with a jeweler's precision onto a pedestal 20 meters high. Erection of an electrode coke production unit here is entering a decisive stage, a facility being built according to the plan for radical renovation of the Azerbaijan oil refining industry. The workers of the Azneftekhimmontazh Trust pledged to mount an additional two coking batteries by the end of July, thus completing installation of the main reactor unit in two months instead of five. The goal of the installation crews is to bring the entire unit into operation ahead of schedule. [By SOTSIALISTICHESKAYA INDUSTRIYA correspondent D. Melikov] [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 10 Jul 84 p 1] 3024

**ZHANAZHOL CRUDE PRODUCTION--**Aktyubinsk--The Zhanazhol field in West Kazakhstan has produced its first 100,000 tons of "black gold." A new subdivision of oil and gas production people was established just 3 years ago -- the Aktyubinskneft' Association. During this comparatively short period of time communities of construction workers and oil workers have sprung up on the steppe, power transmission lines and pumping stations have been erected, and facilities have been built for the production and primary treatment of liquid fuel. Production workforces have already been formed here and have been achieving considerable success since the very beginning of exploitation of local petroleum resources. They include the crews of foremen V. Sviridov and A. Lopukhov of the Oktyabrskoye Drilling Operations Administration. [By IZVESTIYA correspondent E. Matskevich] [Text] [Moscow IZVESTIYA in Russian 10 Jun 84 p 1] 3024

**NEW TURKMEN OILFIELD--**Oil prospectors of the Turkmenneft' Production Association have another multiple producing-zone oilfield to their credit. The very first well drilled in the new South Okarem area struck several producing zones. In the opinion of the experts, crude oil, natural gas, and condensate can be produced simultaneously from this field. Studies are presently being conducted to determine the potential of the field in this field and possible production volume. [By R. Kurbanov] [Text] [Azerbaijan TURKMENSKAYA ISKRA in Russian 15 Jul 84 p 4] 3024

**CASPIAN'S DEEPEST WELL--**The workforce of the floating offshore drilling rig "28 April," headed by O. Selimkhanov, drilling crew foreman Kh. Mamedov and G.

Garibov have achieved excellent results in the first 6 months of the year in competition for high-speed and breakdown-free drilling. These drilling crews were the first in the offshore exploration drilling administration, using specialized equipment, to meet the target for the first 11 months of the year, and are presently close to completing the year's target. The accelerated work pace is due in large measure to a changeover to brigade cost accountability, whereby the drilling crews now have an incentive to achieve good work performance. The search for hydrocarbon accumulations in the Banka Andreyeva exploration area has been in progress for several years now. Five wells have already been drilled. One of them, No 4, was drilled by this crew [brigada], which succeeded, working in difficult geologic conditions, in drilling down to a record depth for the Caspian -- 6,715 meters. The target depth for the hole currently being drilled, No 6, is 6,500 meters. They have already reached the 4,079-meter mark ahead of schedule. [By V. Tikhonov] [Excerpts] [Baku VYSHKA in Russian 14 Jul 84 p 1] 3024

LIQUID OXYGEN PRODUCTION--If one were to calculate the total savings obtained by utilizing liquid oxygen to intensify various industrial processes, a value comparison with precious metal would not seem an exaggeration, for today it is indispensable to many branches of the economy. One of its main suppliers is the Moscow Coke Gas Plant (in the town of Vidnoye). Recently the plant's workforce has implemented a number of measures aimed at improving the liquid oxygen production process. The air separation towers were refurbished, a higher-output nitrogen turbocompressor was installed, operation of the alkaline scrubbers was improved, as were process temperature conditions. As a result the entire production operation, which meets the strictest international operating standards, passes inspection immediately. The highest quality category rating has also been awarded to liquid oxygen produced at the Moscow Coke Gas Plant. [Text] [Moscow LENINSKOYE ZNAMYA in Russian 16 Jun 84 p 2] 3024

GIANT CRANES FOR BAKU--Ramenskoye--The Glavstal'konstruktsiya Plant ships its products to many brother republics. The workforce has established close contacts with the enterprises of Baku and Sumgait in the Azerbaijan SSR. Since the beginning of the year two giant cranes have been shipped to Baku to Azneftekhimmontazh. And the Ramenskoye plant is supplying electrodes to a plant under construction which will produce footings for deep-water platforms. The customers have had no complaints about the quality of the product. [Appeared in ZA KOMMUNISTICHESKIY TRUD] [Text] [Moscow LENINSKOYE ZNAMYA in Russian 14 Jun 84 p 2] 3024

GAS SEPARATOR, DEHYDRATOR--(Azerinform)--The oilfield workers of the Oil and Gas Production Administration imeni Serebrovskiy are obtaining additional tons of condensate each day without drilling new wells or performing any production enhancement measures. They are assisted by a new gas dehydration unit developed by specialists at the All-Union Gas Scientific Research and Design Institute. As we know, natural gas produced from the Caspian seabed, prior to being conveyed to gas processing plants, should be thoroughly dehydrated, and water and hydrocarbon liquids must be separated out. The new unit performs this job much better than its predecessors, which are in operation in the administrations of the Kaspimorneftegazprom Association. Multiple-cooling the gas, running it through a network of special traps, it makes it possible to

ship to the customers a higher-quality product. In addition to its principal "duties," the unit removes from the gas approximately 6 tons of hydrocarbon liquids each day. This year similar units will go into operation in several other oil and gas production administrations and in this republic's underground reservoirs. [Text] [Baku VYSKA in Russian 17 Jul 84 p 2] 3024

KUYBYSHEV WELL SERVICING--Kuybyshev--Fifty production and injection wells were serviced by the crew of foreman Gennadiy Yakovlevich Panov of the Kuybyshevneft' Association. The state was saved 75,300 rubles. This work volume is equal to a 5-year target. For 2 years in a row now this once lagging work team has been designated the best in the Ministry of Petroleum Industry. Three other crews [brigady] in the association, headed by foremen V. Osajchiy, V. Kozlov, and I. Strunkin, have also achieved the five-year-plan target. The accomplishments of the leaders have made it possible this year to produce more than 100,000 tons of crude above and beyond the 6-month target. [By SOTSIALISTICHESKAYA INDUSTRIYA correspondent A. Vorob'yev] [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 20 Jul 84 p 1] 3024

NEW REFINED PRODUCTS TREATMENT--A new petroleum product treatment technique has been developed by specialists at the USSR Academy of Sciences Institute of Petrochemical Synthesis imeni A. V. Topchiyev. Utilization of a catalyst based on complex compounds of iron makes it possible to obtain a higher-grade fuel than with traditional methods. Experimental full-scale tests of the new technique under actual production conditions commenced today. [Text] [Moscow VECHERNYAYA MOSKVA in Russian 14 Jul 84] 3024

GUR'YEV RIG BUILDING--The rig-building crews of the Caspian Oil Exploration Field Unit of the Gur'yevneft'gazgeologiya Association headed by V. Tarasevich and G. Sharipov have reported ahead-of-schedule completion of their five-year-plan targets. These crews have erected 43 and 45 drilling rigs respectively. Each is credited with erecting two drilling rigs above target. These vanguard crews [brigady] have achieved success due to employment of a modular method of equipment installation, which made it possible sharply to reduce the time required to set up rigs. [By SOTSIALISTICHESKAYA INDUSTRIYA correspondent B. Glotov] [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 11 Jul 84 p 1] 3024

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## COAL

### COAL MINISTRY CRITICIZED FOR POOR PRODUCTIVITY

Moscow PARTIYNAYA ZHIZN' in Russian No 14, Jul 84 pp 41-42

[Article in the column "In the CPSU Central Committee Party Control Committee": "On the Ministry of the Coal Industry's Fulfillment of Party and Governmental Instructions on the Universal Use of Advanced Methods for Organizing Production and Achievements of Science and Technology to Ensure an Increase in Labor Productivity"]

[Text] The CPSU Central Committee's Party Control Committee, having examined the results of inspections and having heard the report by the USSR minister of the coal industry, B.F. Bratchenko, noted that the ministry is not sufficiently urgently introducing advanced methods of organizing coal extraction or the achievements of science and technology, as decisive conditions for increasing labor productivity, in solving the problems of the 11th Five-Year Plan--to more fully satisfy the demands of the national economy for coal. The USSR Ministry of the Coal Industry (Minugleprom) has weakly mobilized the efforts of the leadership and engineering and technical cadres, as well as those of workers' collectives, to increase production efficiency and to intensify production in order to fulfill party and government demands that growth in the amount of coal extracted and processed be ensured primarily through an increase in labor productivity.

The great scientific and technical potential of this branch, as well as of those plants that build coal machinery and produce automatic equipment which are under the authority of the ministry, is being insufficiently used for steady growth in labor productivity. The efforts of institutes are being scattered rather than concentrated on the root problems of scientific and technical progress; frequently plans include non-urgent topics or those with narrow applications. In recent years there has been a decline in the amount of research and development by institutes engaged in mining, coal machine-building, automation and several other areas. The results of their work should be on a par with world achievements.

In the State Planning and Design and Experimental Institute for Coal Machine Building (Giprouglemash), Underground Machines (Central) Scientific Research Institute (TsNIIpodzemmach), and several other scientific organizations the average time period for creating new technology and equipment has increased. Certain types of mechanized sets and drilling machines have been under development for 10-15 years.



The machine building plants of Minugleprom are not completing their tasks in producing mechanized sets for extracting coal in thin seams, and seams in complex geological conditions. Over three years of the Five-Year Plan, only about 22 KM-103 extraction systems were actually produced, instead of the 85 that were forecast.

The level of integrated mechanization of extraction operations is lagging behind that required. The amount of faces fitted out with machines and hydraulic supports has grown by only three percent in the current Five-Year Plan, and their average daily output of coal has even decreased, standing at 25 tons below the plan.

Along with the inadequacy of high-capacity and reliable equipment for extracting coal from thin seams, the number of faces where work is being done on cutting side walls is increasing. As a result, in the mines of the Ukraine alone, 25 million tons of rock are brought to the surface together with the coal, whose transport and processing require great unproductive expenditures of material and labor resources.

Due to perturbations in technological discipline and poor control over timely and high-quality repairs to equipment, lost time on highly mechanized faces accounts for more than 20 percent of all operating time. In addition, a portion of the complexes have not been installed for a long period of time, are under assembly, or are being dismantled.

There are grave inadequacies in the branch as a whole, in organizing work to eliminate manual labor and to create the means for mechanizing auxiliary processes. Currently, 44 percent of all workers are engaged in manual labor.

Reconstruction and technical reequipping of underground and strip mines is being carried out slowly; capital investments apportioned for these purposes are not being fully used. For this reason, a considerable number of mines in the Ukrainian SSR, in the Kuznets Basin, and in several other basins are not utilizing their design capacity, which has a negative effect on the volume of extracted coal and the level of labor productivity.

The leadership of Minugleprom is not sufficiently urgently working on fulfilling the CPSU Central Committee's demands concerning the universal strengthening of labor disciplines, the broad dissemination of the brigade style of labor organization, and effective use of spiritual and material incentives. In a number of underground and strip mines the administration, as well as party and professional organizations, is concerned with developing socialist competition, introducing the experience of progressive collectives in accomplishing the tasks with fewer workers, and eliminating unproductive losses in public labor. The number of brigades extracting 1,000 tons and more of coal a day has been reduced by 20 percent. Patriotic initiative in the coal industry to overcome obstacles to increasing labor productivity by one percent above the plan, and additionally reducing production costs by 0.5 percent, has still not received the necessary dissemination.

All this leads to the fact that labor productivity in the current five-year Plan in the coal industry has declined. The plan, according to this very important economic indicator, is not being fulfilled in one-half of the coal extraction enterprises.

Several ministries and departments are not fully accomplishing the tasks in rendering assistance to Minugleprom, set forth by resolutions of the CPSU Central Committee and USSR Council of Ministers. The Ministry of Heavy Machine Construction has permitted a breakdown in the supply of high-capacity open-pit excavators, mechanized sets for working thick seams, drilling rigs, and caged operator loading equipment; the Ministry of the Electrical Equipment Industry has lagged in supplying heavy-duty electric motors; and the Ministry of the Automobile Industry inopportunistically ceased series production of 180-ton dump trucks and permitted a delay in the supply of larger-capacity vehicles.

The Party Control Committee has turned the attention of the minister of the coal industry, B.F. Bratchenko, to the serious lag that he permitted in completing the assignments for growth in labor productivity. His statement that the ministry will take additional measures to rectify those inadequacies and to increase the responsibility of cadres for matters entrusted to them, has been taken into consideration. Organizational work on mobilizing the branch's collectives to overcome their deficiencies and to carry out the tasks and socialist obligations in increasing labor productivity has been strengthened.

The Party Control Committee has considered the statements of First Deputy Minister of Heavy and Transport Machine Building R.N. Arutyunova, First Deputy Minister of the Automobile Industry Ye.A. Bashindzhagyan, and First Deputy Minister of the Electrical Equipment Industry G.P. Voronovskiy, that the ministries will ensure accomplishment of the tasks of supplying new technology and equipment for Minugleprom.

The statement of Chief of the Coal Industry Department of the USSR State Planning Committee (Gosplan) V.S. Taradayko that Gosplan would again review suggestions for offers of assistance to the Ministry of the Coal Industry in developing its branch during the 11th and 12th Five-Year Plans is under consideration.

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## COAL

### GOVERNMENT OFFICIALS DISCUSS PROBLEMS WITH KARAGANDA BASIN MINERS

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 31 Jul 84 p 2

[Article by special correspondents N. Goncharov and B. Glotov: "Talking Things Over with Miners: Settled on the Spot"]

[Text] At the beginning of this year at mines, open pits, and other enterprises of the "Karagandaugol'" association, SOTSIALISTICHESKAYA INDUSTRIYA post boxes were installed. The editorial staff and Karaganda oblast party committee (obkom) of Kazakhstan requested miners to express their opinions on problems of developing the basin's coal industry. The miners actively responded to this request. Hundreds of notes and letters with suggestions, questions, advice, and observations on improving work of the coal industry and organizations associated with it were shoved into the newspaper's post boxes.

The mail from the miners was studied in detail by a specially formed group under the obkom of Kazakhstan. It turned out that it was possible to settle a considerable number of the questions on the spot. The Karagandaugol' association and other organizations immediately turned their attention to them. Many questions were directed at union and republic level ministries and leadership.

Recently, the results of the work with the miners' letters was discussed at a normal SOTSIALISTICHESKAYA INDUSTRIYA "post box." Over 700 miners gathered in the hall. Meeting with them were: G. Nuzhdikhin, USSR deputy minister of the coal industry; V. Gavrilov, deputy chairman, USSR State Committee for Labor and Social Problems; N. Budnikov, chairman of the branch's trade union central committee; B. Akhmetgaliyev, first deputy chairman, State Committee for Material and Technical Supply (Gossnab), KaSSR; N. Makiyevskiy, deputy minister of construction of heavy industry enterprises, KaSSR; A. Kurmangaliyev, chief, passenger transport administration, KaSSR Ministry of Motor Transport

(Minavtotrans). Also participating in the meeting were: V. Zhurin, inspector for the Organizational Party Work Department, CPKa Central Committee; secretaries of the oblast, city, and rayon party committees (obkom, gorkom, raykom), and directors of a number of oblast organizations. The meeting was conducted by A. Korkin, first secretary, Karaganda oblast party committee.

The Spetsshakhtomontazh administration is in Karaganda. All of the equipment for mining faces is in its hands. Assembling the coal sets at the faces quickly and well, the administration has considerably increased the reliability of equipment operations and increased its service life.

As a rule, there is a great deal of trouble with sub-contractors in mining coal. Tunnellers, from time to time, disrupt preparation time of new faces. Year in, year out. And in many mines. It's not surprising that questions such as these appeared in the post boxes: How long will the tunnellers of Karaganda lag behind? Can nothing be done to help them? Looking into this letter, the general director of the association, N. Drizhd, paid heed to the notes of tunnellers' brigade leaders from various mines: "Kirovskaya"; imeni 50th Anniversary of the October Revolution; imeni V.I. Lenin, Yu. Koynov, A. Lushanin, R. Litman. All three advised to more boldly transfer those with experience in erection work to shortwalls. Their reasons: it will increase productive time for the tunnelers and the quality of equipment adjustments. Something along this line, on the level of local initiatives, has already been done in some enterprises. What remains now is to broaden the scale of such works.

N. Drizhd invited over B. Negrutskiy, chief of Spetsshakhtomontazh, and asked him to respond to the brigade leaders' suggestion. And to answer to the point. B. Negrutskiy is known in the basin as a man of enterprise and initiative. He gathered his specialists, and together they reviewed the staffing of all brigades and sections. Here and there they succeeded in strengthening the equipment and in mechanizing manual labor. In this way they managed to free nearly 600 assemblers for work in tunnelling faces. They not only install and adjust equipment, but also repair it. Spetsshakhtomontazh has already succeeded in completing tunnelling works to the tune of two million rubles. Such is the response received to the letter from the post box!

Of course, the grievances of the tunnellers are not small, but there is a change for the better. A true check-point has been found, which required nothing more than regrouping of forces.

The mine mail also pointed out another "sure spot" of the local coal association: most of all, anxiety was expressed about the slow reconstruction of mines and shortage of housing. Many houses are located in the operations area of the mines. The families must be moved from there. The associations and local councils dealt specially with each of such letters from the workers. One of the miners, K. Karimov, writes that eight families live in a building that is, for all practical purposes, wrecked: the

building has begun to sink and cracks have appeared in the walls. The facts have been verified. The Karaganda city executive committee (gorispolkom) and the coal association have come to a joint decision to move these families.

The chairman of the oblast executive committee (oblispolkom), Z. Inkorbayev, reported that, on request of workers of the "Molodezhnyy" open pit mine, a new six-kilometer water line has been constructed. This solved the problem of supplying the working population with water. Miners of the "Aktasskaya" mine requested to establish direct telephone communications between the neighboring mining settlements of Aktas and Saran'.

Many miners are worried about the shortage of pre-school day care centers. It was decided to build four more day care centers in the city this year. The same number of children's centers will be built next year as well. The problem of rebuilding the bath-house in the mining settlement of Shakhan was solved. The road in Karaganda's microrayon No. 12 is being put into order.

Questions from the floor:

[Question] Will there be a youth center built in Karaganda similar to the Palace of Youth in Tselinograd?

[Answer] Z. Inkorbayev: I believe in the future we will solve this problem.

[Question] When will construction of the school in microrayon No. 30 be completed?

[Answer] Z. Inkorbayev: Before the start of the new school year.

[Question] When will the practice of accepting houses with gross imperfections be stopped?

[Answer] Z. Inkorbayev: Recently the party obkom and oblispolkom have received the appropriate document on this problem. We will put this matter in order.

[Question] Why are buses not provided to the miners this year to go to the vacation areas?

[Answer] N. Drizhd: The Passenger Transport Administration has already taken action. Buses are being granted for this purpose.

Our comments. In Karaganda, on the whole, careful attention is being paid to the miners' mail. But, as it has turned out, some people have decided to respond formally all the same. We got such a signal immediately after the meeting. We verified it. According to a letter by the mining foreman of the open-cast section of the "Dubrovskaya" mine, I. Kruglov, the Karagandaugol' Association promised to allot a new excavating machine and several trucks. Due to their shortage, only two work shifts can be managed, instead of three.



"How are things going now in the open-cast section?", we inquired of the mine's director, Ya. Mamontov.

"No change," he briefly responded.

"But were you not allocated an excavating machine and additional tracks?"

"Yes, if you judge by the paper we received from the association. But the excavating machine they offered the mine is unsuitable, and we refused it."

#### Combine and Shovel

"The Karaganda Basin," the first secretary of the obkom, A. Korkin, said at the meeting, "plays an appreciable role in the realization of the energy program of the country. A substantial portion of the union's supply of coking coal comes from here. Nevertheless, it is possible to work better. But until now, new horizons in 17 mines have not been prepared, and 16 shaft systems have not been built. In 7 enterprises mining workers are guided by temporary plans in incomplete horizons. All of this considerably complicated conditions for preparing breakage lines, coal extraction technology, shaft ventilation, fuel transportation, and supply of materials and freight.

For precisely this reason, last year 15 mines and one open pit did not produce at normal capacity. Underground mine output continues to decline. This has been caused primarily by insufficient funds for capital construction and weakness in the sections and organizations of the Karagandashakhtostroy combine and Karagandauglestroy trust. There are great difficulties in the supply of modern equipment and in increasing the output of the construction industry base of the oblast. We are waiting for more active help in all of this from the ministries and departments, primarily from the USSR Ministry of the Coal Industry (Minugleprom).

The USSR deputy minister of the coal industry, G. Nuzhdikhin, during his speech was not able to refute the fact that basin reconstruction is proceeding sluggishly. The burning question of development of light mechanization for delivery of equipment and materials remains open. At the mines we were told that the existing types of cableways and ground roads do not meet present-day requirements. They are difficult to assemble, unreliable, and their load carrying capacity is low. In the Karaganda Basin, each day 300 people with shovels in hand work alongside the heavy-duty equipment to clean up coal spilled in the shafts. In many mines, this makes up an imbalance in extraction and tunnelling.

G. Nuzhdikhin cited the difficulty of the problem. However, it is being worked on in the branch. There is hope that there will soon be innovations in the tunnellers' arsenal. In the Kopeyskiy plant, for example, a conveyor for shortwalls has been developed.

[Question] Voice from the floor: In operational extraction equipment there are many weak points, for example, in the "OKP" [not further identified] system. This leads to break downs....

[Answer] G. Nuzhdikhin: It is true, there are faults in it. The ministry has studied all the claims and has issued a special order. In plants and institutes measures are being taken to increase the reliability of such equipment. But look closely at the work of our leading brigade. They use equipment carefully and efficiently. More than 60 mines in the Karaganda Basin are operating in the 1,000 ton a day mode, and 19 percent are competing to extract 500,000 and more tons of fuel a year. The equipment here is in reliable and considerate hands. Especially in the mine imeni Kostenko. At the same time, in a number of other enterprises we see no technological discipline. And this is most often the cause of the breakdowns and idle time.

[Question] Note from the post box: "We know that mining conditions in the basin are worsening, and that the presence of gas in the seams is increasing. Naturally, higher capacity fans for local ventilation, conveyor belts, and metal rollers have been requested. But the ministry has not responded to the association's request to increase the supply of these items. This is seriously restraining preparatory operations."

[Answer] G. Nuzhdikhin: In such instances it is useful to look at the figures. Only last last year in our basin there were 150 tunnelling sets put into service. This is a very large number. Is it not? More than 15 percent more metal rolled products are being produced this year than last year. However, it is agreed that many supply problems have still not been solved. This especially concerns the supply of spare parts...

The KASSR first deputy chairman of Gossnab, B. Akhmetgaliyev, also admits that not everything has been fully supplied to the basin. But, compared to last year, the association has received, for example, 10 percent more shovels this year. And still there is a shortage. Evidently, this equipment must be used more prudently.

[Question] Posed from the floor: "Why is it difficult to buy water heaters, sinks, and paint in the stores of Karaganda?"

[Answer] B. Akhmetgaliyev: The republic Gossnab will increase the expenditures for these goods.

Many of the questions during the meeting concerned housing construction.

"Yes," responded G. Nuzhdikhin, "the housing problem in Karaganda is being solved slowly. Comrades Bakishev, Polyakov, and Savchenko are correct in writing about this. But, let us look at the problem from another point of view. According to the plan, in the first three years of the 11th Five-Year Plan 52 million rubles were given to the association for housing construction. In addition, another 43 million rubles were transferred by the ministry to the Karaganda Oblast Executive Committee (Oblispolkom) as their share. How were these assets used? For the three years, the Karagandaugol' Association did not use nearly 9 million rubles for these purposes, and altogether the miners did not receive 20,000 square meters of housing. In addition, the Karaganda Oblispolkom owed them 40,000 square meters of housing.

This year, the ministry sent 20 million rubles to the basin and 20.5 million rubles to the oblispolkom. Unfortunately, they used it poorly, just as before: the plan for housing construction was only 85 percent completed.

#### Improved Opportunities

The appearance of USSR State Committee for Labor and Social Problems Deputy Chairman B. Gavrilov aroused great interest. In answering the miners' questions, he revealed the peculiarities and advantages of the new pay scales for mining work. In introducing the new wage rates and increases in salaries for workers in the coal industry, he reported that hundreds of millions of rubles of a supplemental pay fund have been allocated from the state budget, including 40 million rubles for miners of the Karaganda Basin. The wages for basic underground work, and for those jobs that were considered non-prestigious, were greatly increased. The bonus system was also changed.

But the practical work in introducing the new wages revealed a number of aspects that must be worked out. The miners of Karaganda, by their letters, helped us very much.

Many miners, in particular, comrades Arshinov, Leonov, and others believe that the pay for tunnellers must be more flexible, i.e., such factors such as distance and size of mining output are not taken into account in the stipulations for their material incentives. The mining mail, devoted to questions of work and pay, revealed some curious information: in many mines, the productivity of labor after introducing the new pay scales did not increase as predicted, and in some places, the average daily extraction of coal even decreased.

Analysis has shown that bonuses for growth in labor productivity have proved to be meager. Last year, out of every ruble of bonus for increasing output, only one-tenth of one kopeck was paid. Thus, in material incentives of the most basic type, great opportunities were overlooked, and the miners noticed this.

[Question] From the mail box: A group of workers from the optional equipment plant is interested: will new wage rates be introduced for technical and engineering workers of coal machine building enterprises?

[Answer] B. Gavrilov: An increase in pay scales for this category of workers in Karaganda is not projected for the plan for 1985. However, in machine building plants, methods such as the right of the leadership to establish a bonus for high work skills must be more broadly used. For the time being, unfortunately, this lever for increasing work incentives for engineering and technical workers is being feebly used at the Karagandaugol' association. Enterprises in Leningrad have already gone through such an experience. Why should it be repeated at Karaganda?

In recent years in the Karaganda oblast, much has been done so that the miner can go to work and return home unhindered. After his shift, he can spend his

spare time culturally and healthfully. Nevertheless, in operation of the sphere of services, as the letters of the miners testify, much has been left out. With more coordinated action by the coal association and department of passenger transport, it would be possible, for example, to more precisely organize transport of the miners, to replace old buses, and to not permit parallel operations of municipal and departmental lines, etc.

The secretary of the trade union's central committee, N. Budnikov--with letters, facts, and figures in hand--had to explain to the local executives just what had to be done and how, in order to not arouse the criticism of miners to blunders in such obvious matters as the supply period for overalls, towels, and soap. However, there were more complex questions. A master blaster from the mine imeni K.O. Gorbachev, T. Zhumanbayev, and other miners justly criticize the operation of several sanatoria and vacation houses, acknowledged N. Budnikov.

[Question] Voice from the floor: When, finally, will the miners be able to vacation together with their families?

[Answer] N. Budnikov: We have many fine sanatoria and holiday hotels, but there are not enough of them. Therefore, the VTsSPS (All-Union Council of Trade Unions) made a special decision to erect new establishments where workers, including miners, could vacation with their families.

At the meeting, it was agreed that each persons submitting a question, except verbally, will also receive an official response, with the mark "Post Box SOTSIALISTICHESKAYA INDUSTRIYA", and information on the course of handling criticisms and wishes. Copies of such replies are already being sent to the editorial staff. Work on the miners' mail continues.

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CSO: 1822/20

## COAL

UDC 622.33.012 "Sverdlovantratsit" "1981/1985"

### SVERDLOVANTRATSIT REPORTS CURRENT COAL MINING STATUS

Moscow UGOL' in Russian No 9, Sep 84 pp 31-33

[Article by V. I. Radchenko, Sverdlovantratsit Association: "Fulfilling the Quotas of the 11th Five-Year Plan"]

[Excerpts] The Sverdlovantratsit Association contains 22 enterprises and organizations, including 12 mines. The mines are working seven hard coal seams occurring at 4-35° angles and varying in thickness from 0.65 to 1.45 m. The seams were exposed primarily by inclined shafts. Main vertical shafts are present at the mines imeni 60-Letiye SSSR and Krasnyy Partizan, while the vertical shafts of the mines imeni Ya. M. Sverdlov, imeni Voykov No 1-2 and imeni V. V. Volodarskiy are auxiliary. Mining operations are being carried out at a depth of 600-1,100 m. Three mines are developing two seams each, while the rest are working on one.

Ten mines were placed into operation 30 years ago, and they have not been subjected to any significant reconstruction. The Mine imeni 60-Letiye SSSR, the association's largest, went into operation in December 1981 with a projected annual output of 3 million tons of coal.

The working faces of the association's mines are equipped with narrow-swath combines and cutters working in conjunction with mechanized or individual supports. The level of full mechanization of coal mining has been increased to 95.9 percent.

Preparatory drifts are excavated primarily by the blast hole drilling method. The total length of maintained drifts of the association's mines is 612.7 km; this includes 102.6 km of drifts equipped with belt conveyors.

The production association was unable to fulfill its plan in relation to coal mining, labor productivity, cost and other technical-economic indicators in the first 2 years of the 11th Five-Year Plan.

The main reasons for this were that the system of mine management was inconsistent with the requirements of modern mining technology, the low productivity of inclined shafts and the significant mining depth, which increased by 51 m in the association as a whole since 1980. Four mines are conducting mining operations at depths over 1,000 m, while three are doing so at depths from 800 to 1,000 m. The length of maintained drifts, and especially slopes and ramps, increased by 21.1 km.



The proportion of mining from thin seams grew by 6 percent in the last 3 years.

Late commissioning of the Mine named G. L. Letyaev and delays in reconstruction of the Krasnyy Partizan Mine had an unfavorable influence on growth of coal mining volume. Concurrently there were delays in tunneling the vertical shafts of the mines named V. V. Volodarskiy, Tsentrosoyuz and Krasnyy Partizan (the shortfall was 1,507 m), and three permanent hoisting units had not been placed into operation.

Seven new horizons and 74 working faces were introduced to replace depleted ones, six main ventilation fans and three hoists were introduced, and 300.8 km of exposing and preparatory tunnels were dug in the association since the beginning of the five-year plan on the basis of a previously developed complex of measures.

Coal mining complexes of a high technical level--KM-85, KM-87UM, 1KMT, KMS-97 and others--were introduced into the association's mines. These complexes made it possible to increase the load on the working faces and improve the technical-economic indicators of work on longwalls.

Thus the coal mining volume of the Mine named V. V. Volodarskiy was increased as a result of introduction of a 1KMT complex equipped with supports of higher carrying capacity, in place of a KM-87 complex. Use of this complex raised the average daily load on the longwall by 16.4 tons, while labor productivity at working faces increased by 19.7 percent.

Use of 1KMT complexes in complex mining and geological conditions made it possible to reduce the level of heavy manual labor owing to elimination of certain types of jobs: recovery of jammed support sections by means of blast hole drilling, removal of waste rock from the slope area, erection of additional temporary supports (installation of metallic cables and wooden shacks in section roofs), restoration of upset roof sections, and the large volume of repair and restoration jobs associated with replacing support section units. The quality of the extracted coal has risen owing to the strength of roof rock.

Production of small mechanized tools has been organized at the association's mechanical repair plant with a consideration for the needs of the mines. Platforms for transporting sections of mechanized supports and delivering arched supports, TNDK carts, HEP-670 and HEP-900 rolling platforms, cable-type pushers, light manipulators and other articles were assimilated and placed into serial production by the plant. In 1953 it produced small mechanized tools worth 60,000 rubles.

In order to insure successful fulfillment of the planned measures, the association's enterprises organized 17 brigades to introduce mechanized resources into auxiliary processes, and jointly with organizations for scientific organization of mining labor and the All-Union Society of Inventors and Efficiency Experts they set up 50 creative brigades to develop proposals directed at creating new resources for mechanizing auxiliary processes and

improving existing ones. In 1983 they developed and introduced 149 proposals with an economic impact of 112,000 rubles, concurrently releasing 88 persons for other work.

The creative brigades developed and introduced:

at the Mine imeni 60-Letiye SSSR--a device for mechanized lifting of roof timbers based on IPNB-2 rock loading machines, a method for continuous delivery of equipment and materials using a DMK conveyor, and a hydraulically operated knife to cut wooden struts;

at the Mine imeni Ya. M. Sverdlov--a mechanized system for transferring bulk materials out of one car into another, a method for increasing the length of terminal tracks using NIM-3 loaders, and a hydraulic manipulator based on a IPNB-2 loader;

at the Mine imeni Vaykov--a modernized IPNB-2 loader with two drives for its taking unit, a hydraulically operated stripper for removing half-couplings from electric motors and reduction gears, and an improved head end for an AP-7.2 conveyor for recess-free coal extraction;

at the Leninakaya Mine--a frame for installing manipulators on rock loaders, a device to clean shaft sumps and water collectors, a device to suspend cables at shortwalls, a light ground-level conveyor based on an LYD-24 winch, and so on.

The work that has been done insured fulfillment of the quotas for raising the technical level of production and reducing manual labor. One hundred thirty-six persons were transferred from manual labor to mechanized and automated labor. The number of manual workers released for other work as a result of mechanization of production was 710. The annual economic impact from mechanizing manual labor was 1.81 million rubles. As of the beginning of 1984 the proportion of manual workers was reduced to 42.8 percent, as compared to the planned 43.3 percent.

Coal mining and tunneling machines presently in operation require significant overhaul. An average of about 12,000 units of equipment undergo overhaul in the association throughout the year; this is a total of more than 3.27 million rubles.

For a number of years the association's power machinery service worked purposefully to improve the system for supporting the use and repair of mining equipment. Overhaul of electric motors was centralized. Then as the necessary production spaces were created, and as the structure of the service's centralization was determined, the association converted to full centralization of overhauls and supply of basic mining equipment to the mines. A special production technology service for supplying equipment to stopes and shortwalls was created under the assembly-disassembly operations administration and placed under the charge of the Deputy Chief of production control. The service forwards equipment for overhaul, insures a constant flow of equipment to repair enterprises for repairs, keeps records on equipment use, handles claims

with repair enterprises and manufacturing plants, maintains logs on each unit of equipment and signs contracts leasing this equipment out. The service includes a section for the storage and exchange of electric equipment, pumps, electric motors, local ventilating fans, transformer and magnetic stations and electric drills. The service also contains a section for preoperational preparation and storage of mining equipment. The section prepares mining combines, rock loaders and pumping stations for operation (in accordance with plant instructions), and check the quality of hydraulic supports.

The production technology service for equipment supply made it possible:

to relieve the mines of the need for sending equipment out for overhauls and receiving it back;

to significantly improve the use of motor vehicles to convey equipment, owing to coordination of the schedule for receiving articles from overhaul and preparing equipment for overhaul, and use of rail transportation to carry mechanized support sections to the Gorlovka and Antratsit mine repair plants when the overhaul volume is sizable;

to reveal obvious defects and malfunctions in equipment during preoperational preparation immediately after its receipt from suppliers, which reduced the breakdown frequency of mining and preparatory equipment;

to improve the use of mining and preparatory equipment; to create the conditions for effective utilization of reserves;

to maintain a constant pool of mining equipment at all repair enterprises;

to improve recycling of scrapped parts.

Further improvement of the system for supplying and using mining equipment required conversion to leasing. Mining combines and rock loaders are now being leased out. Preparations for the leasing of pumping and magnetic stations and mobile compressors are coming to an end. After the required production space is created, stope conveyors and mechanized supports will also be leased out.

In order to obtain the maximum possible economic impact from introducing new equipment, we need to improve the organization of labor and production, and the wage system. All pieceworkers and 40.3 percent of the timeworkers in the organization now fall under the brigade form of labor organization. A total of 104 brigades have been created, to include 42 more brigades in 1983 for a total of 1,830 persons. Daily integrated brigades that are paid wages on the basis of the end results of their work have enjoyed the greatest acceptance in mining and preparatory operations (212 brigades, or 53.9 percent). Wages in 187 brigades on a piecework and a piecework-bonus system are calculated on the basis of a single order, and in 111 of them the coefficient of labor participation is considered. In 109 of the 213 timeworker brigades wages are calculated on the basis of a standard quota; this includes 20 brigades in which the coefficient of labor participation is considered as well.

Eight brigades are operating on a *bezraschet* basis; of these, three are employed in coal extraction and five do preparatory tunneling. They surpassed the plan for 6 months of 1984 by 139,900 tons of coal, and they surpassed the draft drilling plan by 105 m. In this case the output norms were met by 106.5 and 102 percent respectively.

As a result of these technical and organizational measures a tendency for improvement in the basic technical-economic indicators made itself known in the association in 1984. This meant the sale of an extra 3.5 million rubles worth of industrial products and extraction of 339,000 tons of coal in excess of the plan. The increase in coal extraction between 1982 and 1983 was 90,000 tons. Over 80 percent of the increase in production volume was accounted for as a result of growth in labor productivity. Accumulation was over 1.5 million rubles in excess of the plan.

In 1984 the Association was given higher quotas in relation to all indicators. The industrial production plan was made 2.2 million rubles larger than the 1984 plan. A total of 2.48 million tons of coal must be extracted.

Specialized integrated programs embracing the most important directions in the production and economic activities of the collectives were developed at all enterprises and in the association as a whole in order to insure successful fulfillment of the 1984 quotas. These directions include:

development and utilization of working faces;

improvement of preparatory mining operations;

restoration of the length of drifts in unsatisfactory condition;

improvement of the quality of the mined coal;

"*Pusher*" (integrated organizational-technical measures to raise labor productivity in 1984);

"*Pusher*" (integrated organizational-technical measures to reduce coal mining costs in 1984).

In January of 1984 the association was able to fulfill its plan and its economic program in regard to all of the principal technical-economic indicators. Within this period the gross industrial production plan was 100,000 rubles, or 100 percent. The coal extraction plan was surpassed by 108,100 tons. In comparison with the corresponding period of 1983, the coal mining output increased by 70,100 tons. Pay per industrial production worker exceeded the planned level by 170 rubles, or by 5.4 percent; this included the increase of wages, 14.4 percent in concentration factories and 2.7 percent at machine-building plants. Labor productivity in the association was 47.6 tons per miner, as compared to the planned 45.7 tons per month. The coal extraction plan was surpassed by 21.3 percent owing to growth in labor productivity.

The principal factors which promoted a 4.2 percent increment in coal miner labor productivity in the association as compared to the planned level were:

growth in the technical level of production (by 1.3 percent);

concentration of production (by 1.8 percent);

improvement of the organization of production and labor (by 1.1 percent).

The plan for coal extraction at fully mechanized working faces in 6 months of 1984 was met by 104.7 percent. Over a third of the extra coal was mined at stopes equipped with complexes of the new technical level, for which labor productivity averaged 16 percent higher than at longwalls operating under similar conditions and equipped with KM-87 complexes. This insured a 0.43 percent increase in labor productivity.

A 1.2 percent labor productivity increase was also achieved as a result of implementing measures to mechanize and improve mining preparations.

Intensification of the use of working faces through prompt and high quality preparation of the lines of working faces, through reduction of the breakdown frequency and through improvement of the quality of technical maintenance and repair of the equipment of fully mechanized longwalls and underground transportation was an important measure.

The number of repairmen and machine operators was brought into correspondence with the actual labor-intensiveness of maintaining mining equipment in order to improve scheduled preventive maintenance and reduce the breakdown frequency. Repair shifts have been included in the composition of integrated brigades working at all fully mechanized stopes. A statute on organizing scheduled preventive maintenance was developed and is now being introduced.

In 6 months of 1984 nine of the association's mining brigades worked with a daily load of 1,000 or more tons per day, which is in keeping with the quota set by the Ukrainian SSR Ministry of Coal Industry. These collectives extracted 2,341,000 tons of coal (48.8 percent of the total extraction), which includes 257,000 tons in excess of the plan. The labor productivity of workers at thousand-ton longwalls was increased to 21.5 tons per shift, which is 1.6 times higher than at other stopes with similar conditions.

The association's mean daily longwall load was 612 tons, as compared to the planned 500 tons. This insured a relative decrease in the number of miners by 250 persons and a 1.6 percent increase in labor productivity.

The association is implementing a complex of measures to reinforce labor discipline. Thus in 1984 absenteeism among miners was reduced 10.4 percent from the level of the corresponding period in 1983.

In 6 months of 1984 the cost of coal mining decreased by 3.1 percent in comparison with the planned level.



The main factors behind the decrease in cost were:

growth in labor productivity, as a result of which the coal mining plan was exceeded by 184,000 tons (92.9 percent) and 2.29 million rubles of costs were saved;

economization of material, fuel and energy resources for a total of 178,000 rubles.

Current accounting of expenditure of materials by enterprises, sections and brigades was organized by the association's information and computer center. A statute on paying bonuses to brigade collectives and individual workers for economizing on specific materials was introduced.

Sixty-five tons of rolled ferrous metals, 138.1 m<sup>3</sup> of timber, 10.3 million kilowatt-hours of electric power, 24,100 gigacalories of heat and 435.3 tons of boiler and furnace fuel were saved in 6 months. One thousand four hundred twenty-five outfits of arched metallic supports and 1,215.7 tons of rails were recycled, and 10,300 teeth, 36,300 cutters and 7,700 km of ventilation pipes were restored.

The work results for 1984 confirmed that the selected directions for raising production effectiveness are true, and that they do allow the collective to count on unconditional fulfillment of the quotas for the five-year plan and the pledges they adopted.

The guarantee of success lies in precise engineering and worker's initiative, effective socialist competition among units, brigades and sections to raise productivity and reduce the cost of coal.

RIGHT: IZDATEL'STVO "NEDRA", "UGOL'", 1984

11004

CSO: 1822/57

## COAL

UDC 658.3.015.25:622:33.012 "Yuzhkuzbassugol'"

### YUZHKUZBASSUGOL' REPORTS CURRENT STATUS OF COAL MINES

Moscow UGOL' in Russian No 9, Sep 84 pp 24-27

[Article by V. D. Yallevskiy, Yuzhkuzbassugol' Association: "On the Road to High Technical-Economic Indicators"]

[Text] Laborers of the Yuzhkuzbassugol' Association completed their 1983 plan and the plan for 3 years of the 11th Five-Year Plan ahead of schedule, having mined 28 million tons of coal, to include 670,000 tons in excess of the plan. Just in 1983 alone the coal mining volume was over 750,000 tons more than in the previous year.

Attainment of the good work results was promoted by mobilization of the collectives for fulfillment of the high socialist pledges adopted by the laborers for 1983-1985 and for the 11th Five-Year Plan as a whole.

The association's mines are working coal deposits with varying mining and geological conditions. The orientation of the seams varies from gently to steeply sloping, and seam thickness varies from 0.8 to 10 m. All mines offer a gas and dust hazard, 13 are beyond the normal category classifications, six are dangerous in relation to underground shocks, three mines have seams offering a danger of outbursts of coal and gas. Most seams contain coal prone to spontaneous combustion, which requires special procedures for its preparation and removal.

Because mine reconstruction is falling behind, the volume of coal extracted from fields stripped on an incline is increasing with every year. In 1983 over 14 million tons of coal, or 52 percent of all coal mined by the association, were obtained from such fields. The mining depth at certain mines exceeds 500 m.

The main mining system is long pillars on a line of bearing. Coal is extracted in the reverse direction, and roofing is controlled by allowing its complete collapse. Shield and chamber-pillar mining systems are employed at mines working steep and inclined seams.

The association has developed a program for reequipping the main production operation and improving the procedures of the extraction and preparatory operations on the basis of the achievements of science and technology; this

program is being implemented systematically. The program provides safety of measures to raise the effectiveness of work at fully-mechanized stops and to insure anticipatory preparation of working faces. The number of mechanized working faces is steadily decreasing, but the volume of coal extracted by mechanized complexes is growing.

Because of the general tendency for the number of fully-mechanized stops to decrease due to worsening of mining and industrial conditions as the mining depth increases and as the effort is transferred to collapsed seams, the association has taken the tack of acceleration replacement of EM-61, EM-67, MK and OKP mechanized complexes by complexes of a new technical level--OKP-70, KM-130, UKP and KMT, which work with supports of greater operating resistance, and by combines and conveyors characterized by a high power-to-worker ratio and productivity. Correspondingly, conveyors in sectional drifts and on slopes and ramps were replaced by new highly productive conveyors (L-80, 2L-80, 1LT-80, 2LT-100, etc.).

A major effort was made jointly with the Dnepropetrovsk Scientific Research Institute of Coal, the State Planning, Design and Experimental Institute of Coal Machine Building, the Moscow Region Scientific Research, Planning and Design Institute of Coal, the VNIMI (All-Union Scientific Research Institute of Mine Surveying) and the Mining Institute named A. A. Zhdankinsky to substantiate, create, test and introduce mechanized complexes for seams with hard-to-collapse roofing (2UKP, 1UKP, etc.), which has great significance to the entire sector, inasmuch as the number of seams with such roofing is (according to VNIMI data) about 10 percent of all readily mining seams in the country's coal basins.

Reequipment has resulted in an increase in the volume of coal extracted from fully mechanized stops, a rise in the load on the working faces, and an increase in labor productivity. In 1977, 10.7 million tons of coal were mined from fully mechanized stops; this is 30.1 percent of the association's total coal mining volume. Mechanized complexes of the new technical level, which represent 59.1 percent of all equipment, contributed 30.1 million tons, or 72.2 percent of the total amount mined from mechanized complexes. The load on these complexes attained 1,373 tons per day in 1977, which is 1.97 times greater than the load on obsolete complexes. Most complexes of the new technical level underwent testing, and some are now working in the association's mines.

Much attention is being devoted to improving methods, the planning decisions and the systems for preparing and working the extraction fields, which is promoting highly productive use of the available equipment. This made it possible to insure that in 1977 the reserves of each prepared longwall would average 60,000 tons (20 percent less than in 1976).

Flanking drifts dug at a number of mines at the recommendations of the MSU [Moscow Mining Institute] make it possible to separate working and preparatory operations in time and in space, and to reduce the time it takes to assemble and disassemble mechanized complexes and to convert working faces to direct-flow ventilation, as a rule keeping the roadway drift intact for subsequent

use to ventilate the next longwall. In 1961 the volume of coal mining using pillarless systems for preparing and working the stopes attained 14 million tons (55 percent), and it will increase in the future.

Just at the Rospadskaya Mine alone, introduction of 4KM-130 and 4KM-81E complexes made it possible to reduce coal losses due to an increase in seam thickness from 12.7 percent in 1960 to 2.5 percent in 1961.

An important technical experiment is being conducted at the association's mines--conversion from three-slice to two-slice extraction from thick and steeply sloping seams of the Tomusinskoye deposit. This made it possible to reduce the volume of preparatory work by 30 percent and increase the height of an extraction pillar by a time and a half. Introduction of a combined face simultaneous extraction from two adjacent slices at the Tomusinskaya Mine demonstrated a number of advantages over three-slice extraction. Conversion to two-slice extraction necessitated development of new designs for mechanized supports and combines, and solution of certain specific problems that arose in working a slice over 4 m thick. These problems are being solved jointly with sector institutes.

The Mine imeni V. I. Lenin is conducting acceptance trials of the 4KM-81E mechanized complex, which contains 1,140 volt electric equipment, and an experimental combine of the unified series 4KUP-27. The 4KUP-27 combine was used in this complex, and they passed the trials successfully. Their production increased the thickness of the extracted seam to 5 m, which opened up a possibility for working a 10-meter seam in two slices.

In order to insure continuous use of mechanized extracting complexes is the association's engineers, technicians and leading workers developed, jointly with colleagues of the MGI, a system for working extraction areas in which the mechanized complexes are turned 180 degrees and introduced from a spent pillar to an adjacent extraction pillar. The procedure of turning 4KM-81E and 4KM-130 complexes 180 degrees was carried out at the Tomusinskaya and Rospadskaya mines. Using this complex in this way, V. I. Lenin's mine has achieved an average monthly load of 75,000 tons, and in 1961 it produced a total of over 1 million tons of coal. Efforts are now being made to expand the range of application of this method for using mechanized complexes.

The loading of coal into hoppers underground was initiated at V. I. Lenin's mine, achieving high productivity at working faces. Just at the last summer 1961 made it possible to reduce idleness of fully mechanized stopes by 10 percent.

Gas control systems developed jointly with the MGI are being actively employed. In addition to flow-through ventilation, there are also using drilling degasification shafts from the surface and using surface shaft degassing units.

The association is devoting priority attention to preparing design and organizing the work of tunneling brigades. A series of measures are being implemented to reequip and improve tunneling procedures. The tunneling machine fleet has been almost completely renewed at the mine, the mine (1961,

4FF-2, 2FNB-2 and other machines are now being used for tunneling. The experimental DP-1 tunneling complex was tested.

Introduction of new equipment increased by 6.3 percent (in comparison with 1980) the volume of tunneling carried out with mechanized loading of coal and rock, including with the use of combines. In 1983 the proportion of drifts dug by combines attained 60 percent.

Mine digging procedures are being improved. As a rule conveyor drifts are dug using telescopic belt conveyors which are left in the tunnels and used in subsequent mineral extraction. Monorail and surface roads have enjoyed further introduction as a way of mechanizing transportation operations.

The length of preparatory workings secured by anchor supports is increasing each year. Production and introduction of anchors, drilling rods and boring bits with a diameter of 28 mm was organized for the first time in the sector on the initiative of the association's engineers and technicians. This significantly reduces the energy outlays on drilling, increases the rate at which roofing is secured, and provides a significant savings of metal. The central electromechanical shop in the city of Osinniki is assembling a rolling mill to manufacture reinforced screws and rods of small diameter to make it possible to apply a fundamentally new strengthening method.

The association has organized production of metallic lattice tie bars with fireproof fiber glass fabric liner, and manufacture of a lightened tie bar out of polymers made from fifth resin and coke production wastes. These supports are much more economical than traditional ones (wooden, reinforced concrete and so on).

The association's mines are making an effort to mechanize auxiliary processes in compliance with the integrated program for reduction of manual labor, drawn up for the 11th Five-Year Plan. Creative groups for development and introduction of mechanized resources that would reduce or assist heavy manual labor were created in most mines.

The number of fully mechanized stopes in which the manual labor of cutting recesses has been eliminated increased significantly (from 38 to 67.2 percent). This became possible owing to the use of mining combines with a chainless advancing system, and two-combine extraction using an APUG retaining system and a separating device proposed by V. F. Bardyshev, a brigade leader at the Novokuznetskaya Mine.

About 80 percent of the working faces are equipped with crushers developed by creative groups of efficiency experts of the Zyryanovskaya and Imeni V. I. Lenin mines. This excluded heavy manual labor associated with crushing oversized chunks of coal.

Manipulators installed on GPK combines for preparing roofing for installation of anchor supports enjoyed wide introduction at the association's mines following a proposal of efficiency experts at the Tomskaya Mine.



Materials and equipment are delivered to shortwalls by monorail. The central electromechanical shop of Mezhdunarodnaya has begun production of lightened monorail systems. The level of mechanized delivery of materials and equipment to shortwalls increased 17 percent between 1981 and 1983.

There are many efficiency experts in the association whose proposals have produced a total economic impact of 6.1 million rubles in 1983.

Mechanization of auxiliary processes made it possible to reduce the proportion of manual workers to 41 percent--that is, 2.5 percent in comparison with the 1983 plan, and by 9.6 percent in comparison with 1982.

But at the same time the level of manual labor at the mines still continues to be high, especially in preparatory operations, in underground transportation and on the mine surface. This can be explained by a shortage of series-produced resources for mechanizing individual production processes, by the absence of specialized plants that could manufacture them, and by the extremely limited assets available for acquiring existing mechanisms.

The Association places priority on problems associated with improving production control, labor organization and wages.

Looking ways to raise the effectiveness of mine management, the association is carrying out an appropriate reorganization. The main idea is to achieve clearer division of administrative functions and to create khozraschet production services--production preparation, mineral extraction and operational control--without increasing the size of the work force. New management systems have been introduced at five of the association mines in coordination with the Kuzbassugol' All-Union Production Association and the USSR Ministry of Coal Industry.

The brigade form of labor organization and remuneration is acquiring increasingly greater significance to the solution of economic and social problems at the present stage of development of coal industry. At the association's enterprises, 64.3 percent of the total number of workers are brought together into brigades. Brigades created at working faces and shortwalls contain auxiliary workers (previously timeworkers) who carry out jobs in the production cycle between the stope and the loading point. All brigade members receive wages based on the end product. This form of labor organization and wages is now being employed in 70 percent of stope mining brigades and 40 percent of brigades involved in preparatory operations. All members of brigades at the Kamenskaya and Kapital'naya mines receive wages based on the end result.

The brigade form of labor organization and wages is being applied more and more to timeworkers. The workers of such brigades receive wages not for the amount of time they spend at work but for completing a certain complex of jobs falling within the brigade's zone of service. In this case payments for cross-training, for widening the zones of service and for completing jobs with a smaller number of workers are made to the brigade collective. The workers become materially interested in raising labor productivity, and wages

grow concurrently. There are now 106 brigades of this kind operating in the association. This form of labor organization is most effective in auxiliary sections--maintenance of conveyor lines and of permanent facilities and services on the surface.

Creation of integrated brigades necessitated development of the corresponding rules for distributing wages among brigade members with regard for the quantity of labor invested into the overall results. The coefficient of labor participation is widely employed in wage distribution. It is used in practically all mining and preparatory brigades when calculating all forms of wages. Forms of labor organization have appeared in which the coefficient of labor participation is considered in the distribution of wages among different shifts of start-to-finish brigades, which creates a possibility for assessing the contribution made by the winners of the socialist competition, and their material reward.

The search for production reserves is insuring growth in the labor productivity of the workers and, on this basis, stable fulfillment of the association's coal mining plans and its principal technical-economic indicators (see table).

Показатель (1)	1980	1981	1982	1983	1983 к 1980
Добыча угля общая, тыс. т (2)	25 189	26 733	27 251	29 021	111,2
Среднесуточная добыча, т (3)	71 717	76 177	77 128	79 041	110,2
Добыча угля из очистных забоев, тыс. т (4)	22 109	23 614	24 189	25 086	113,5
В том числе из комплексно-механизированных (5)	19 142	21 048	21 810	22 727	118,7
Среднедействующее число очистных забоев (6)	89,3	88,6	84,9	83,0	92,9
В том числе комплексно-механизированных (7)	55,9	59,3	58,9	57,2	102,3
Средняя длина одного забоя, м (8)	97	98	102	103	106,2
Среднесуточная нагрузка на очистной забой, т (9)	704	759	801	853	121,2
В том числе на комплексно-механизированный (10)	971	1010	1039	1119	115,2
Проведение выработок с механизированной потружкой, м (11)	196 487	203 706	202 923	206 387	105,0
В том числе комбайнами (12)	154 270	159 810	161 108	164 441	106,7
Производительность труда рабочего по добыче угля, т/чел (13)	67,7	69,9	69,3	70,6	104,3

Key:

- Indicator
- Total coal extraction, thousands of tons
- Average daily extraction, tons
- Coal extracted from working faces, thousands of tons
- Including from fully mechanized faces
- Average number of operating working faces
- Including fully mechanized faces
- Average length of one stop, m
- Average daily load on a working face, tons
- Including fully mechanized face
- Tunneling assisted by mechanized loading, m
- Including with the use of combiners
- Coal mining labor productivity per worker, tons/month

The effectiveness of using manpower and material resources and the level of labor productivity depend in many ways on the indicators of production concentration. The latter primarily entails increasing the load on the mine and on the working faces and shortwalls, and raising productive capacities by implementing organizational and technical measures without making significant capital investments.

Calculations show that under otherwise equal conditions, a 1 percent increase in the load on a mine produces a 0.2 percent increment in labor productivity, while a 1 percent rise in the average daily load on a working face increases labor productivity by 1 percent. The association has achieved certain results in this direction. The average monthly load per mine was 145,401 tons, which is 1.1 percent greater than in 1982; the average daily load per working face is 863 tons, which is 12.5 percent greater than the planned level and 6 percent greater than in 1982. An increase in the daily load per working face of 95 tons in excess of the plan was equivalent to freeing 450 workers and increasing labor productivity by 1.4 percent. A 2 percent increase in the proportion of mine operations carried out with combines promoted a 0.3 percent increase in labor productivity per worker in 1983.

The association's labor collectives adopted counterplans for 1984 foreseeing a 1 percent rise in coal mining labor productivity. This is to be achieved by increasing the proportion of coal mined from fully mechanized stopes to 33.3 percent of total stope extraction, raising the level of mechanization of preparatory tunneling to 80 percent and introduction of the brigade form of labor organization in other underground operations and on the surface to 70 percent, and widening the use of advanced skills so that the number of thousand-ton brigades could be increased to 48, including 15 extracting 300,000 tons of coal per year, and so that the number of high-speed tunneling brigades could be increased to 31.

If the labor-intensiveness of mining and preparatory operations is to be reduced and if manual labor is to be decreased, we must hasten creation of mining complexes characterized by a high power-to-worker ratio and using a completely advanced system permitting extraction of stope coal without cutting rock, and creation of a high-productivity tunneling complex intended for rock with a strength factor of 10 on Prof. M. M. Prutskiyakov's scale; series production of mechanized supports suited to pillarless production in which drifts are left intact; creation and introduction of polymer articles (tie bars, anchors, roof timbers) and fillers for use in supporting material. Moreover an operation producing resources for mechanizing heavy and manual labor in mining and preparatory operations and in the delivery, assembly and disassembly of equipment must be organized in the Yuzvetsk Basin.

Thus re-equipment of enterprises of the Yuzhkuzbassovskiy Association, improvement of coal mining procedures, production control, labor organization and wages, introduction of advanced skills and development of the creative initiative of the workers on the basis of socialist competition will promote further growth of the labor productivity of coal miners.

CHIRIKOV (MAGAS'KOV) "NEKA", "UGOL", 1984

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COAL

#### MATERIAL SHORTAGES CAUSE CONSTRUCTION DELAYS

Moscow STROITEL'NAYA GAZETA in Russian 1 Jul 84 p 1

[Article: "Commentary from the Department of Industrial Resources and Construction"]

[Text] In our country, two trusts--two "monopolists"--carry out the laying and erection of production units for coke-oven batteries. These are Kokso-Khimteplomontazh and Koksokhimmontazh. Equipment renovation fell to their lot this year. And not by chance. In fact, with reconstruction of the batteries, less resources are being expended for one ton of coke production than with new construction--by a factor of two.

But in both cases, each day is on the account of the builders and erectors. In order to hurry things up, agreements are being concluded for brigade contracts for all stages of general construction, erection, fireproofing, and shake-down operations. Among the construction projects, an intricate system of socialist competition is functioning according to the principle of a "workers' relay." But it is not working out everywhere, chiefly due to the shortage of fireproofing materials. The U.S.S.R. Ministry of Ferrous Metallurgy (Minchermet) this year assumed special control over its plant-suppliers. And the result did not delay in showing itself. The Kommunar'skiy and Zaporozh'skiy coke-oven batteries will be placed into service ahead of schedule.

However, matters with other units are going differently. The union Ministry of Ferrous Metallurgy did not set up strong links between its plants and installations just starting up. For this reason, an alarming situation was created at the 4th Magnitogorskiy and Novokuznetskiy batteries. Until now, the Pervoural'skiy and Semiluk'skiy Dinas plants were among the debtors to the builders of these units.

Today, such a state of affairs is not even accommodating the collectives operating in buildings under construction. Next year the renovated units in Magnitogorsk, Donetsk, Novokuznetsk, and Kommunar'sk must once again go on line.

A resolution by the CPSU Central Committee and USSR Council of Ministers, "Improving Planning, Organization, and Guidance of Capital Construction," opens up new possibilities for the maximum use of possessed reserves, increasing efficiency, improving the quality of work, and broad use of advanced materials and constructions. Based on this, it is necessary to ensure the absolute introduction of all planned units and capabilities of Kikarkhin.

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## COAL

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### HIGHER LABOR PRODUCTIVITY SOUGHT IN COAL MINING

Moscow UGOL' in Russian No 9, Sep 84 pp 3-6

[Article: "Raising Labor Productivity--the Most Important Task of Miners"]

[Text] The USSR's long-range Energy Program foresees, as one of the most important objectives in supplying the national economy with fuel and improving the country's energy balance, significant growth of coal extraction as a result of the development of open pit coal mining in eastern regions, where large fuel and energy complexes are being created. Extensive measures are being implemented to reequip mines of the Donets, Kuznetsk, Karaganda, Moscow, Pechora and other coal basins in the country.

The principal direction for solving current and long-range problems is all-out increase in labor productivity--the most important factor of raising the effectiveness of the country's economy and the people's welfare. In coal industry, owing to reequipment of mines and open pits, reconstruction of coal extracting enterprises and the commissioning of new enterprises, coal extraction increased from 615.3 million to 709.3 million tons in the 9th and 10th Five-Year Plans. In this case coal extraction by the most progressive open pit method developed at the fastest rate; in this method, the productivity of a worker's labor is almost ten times greater than in the underground method. In the sector as a whole, the labor productivity of coal extraction increased during this period from 57.5 to 68.9 tons/month, or by a factor of 1.2.

The Communist Party and Soviet government are providing considerable assistance to the sector in the effort to raise production effectiveness, develop the principal coal basins, reequip the enterprises and improve the wage system. Decrees adopted on these questions in 1981 became the fundamental documents for all workers of coal industry.

Considerable organizational work done by business, party, trade union and Komsomol organizations to fulfill the specific measures spelled out in these decrees produced tangible results. In 1983 the USSR Ministry of Coal Industry sold industrial products totaling 17 billion rubles (100.1 percent of the plan) and extracted 708.1 million tons of coal. The open pit coal mining method enjoyed further development; in 3 years of the 11th Five-Year Plan its volume increased by 20 million tons. The coal enrichment volume increased at a high pace. Production of basic mining equipment increased, and the total volume of



coal machine building climbed by 17.4 percent (calculated on the basis of standard net production).

Capital investments increased by 22.4 percent. Productive capacities capable of extracting 32 million tons of coal and processing 8 million tons were placed into operation. The capacities of coal machine building enterprises and of prefabricated reinforced concrete articles plants were widened. A total of 6.3 million m<sup>2</sup> of housing space was erected.

The most important objective of all of the sector's labor collectives is to raise the effectiveness of production, intensify it and insure an increase in the coal mining and processing volumes primarily as a result of raising labor productivity and accelerating technical progress.

The capital invested into reconstruction, reequipment and maintenance of the output capacities of existing enterprises was 2.7 billion rubles more in the 11th Five-Year Plan than in the 10th. This is why special attention must be devoted to accelerated development of mining operations. In 1983 the plan for mining operations, especially major ones, was surpassed, and the quantity of vertical shafts that were tunneled and deepened was 1.6 times greater than in 1980. The proportion of progressive mining systems was increased to 79 percent, and about 60 percent of the coal exposed by mine shafts is extracted using pillarless technology. But even this is still far from enough to raise the technical level of production to the required height.

We need to intensify our efforts to create and develop production of mining equipment for complex mining conditions. Series production of KM-103 and KD-80 mining complexes for gently sloping thin seams, ANShch machine units and KGDU supports for steep seams, and KMT and 2UKP complexes for work in the presence of hard-to-control roofing was initiated in the present five-year plan. Manufacture of highly productive scraper conveyors, telescopic conveyors, 4PP-2 and 4PP-2Shch tunneling combines and other new forms of machinery for mining  $\pm 18^\circ$  slopes was assimilated. A combine and the Sibir' blast hole drilling complex intended for mining hard rock were prepared for series production. All of this is making it possible to significantly improve the structure of the mining equipment sent to the mines.

Because the mines were provided highly productive equipment, the level of full mechanization at working faces increased from 67.4 percent in 1980 to 71.4 percent in 1983, while full mechanization has been achieved in the Karaganda, Pechora and Moscow basins as well as in a number of associations of the Donets and Kuznetsk basins. The proportion of mining carried out by combines increased from 38.1 to 41.2 percent. The proportion of workers doing manual labor decreased in 3 years of the 11th Five-Year Plan from 45.4 to 43.9 percent. But this is clearly not enough, if we consider that heavy manual labor is significantly restraining growth of labor productivity. Ventilation systems were rebuilt and 287 new, more powerful main airing fans were placed into operation at 66 mines in 1981-1983 in order to improve the working conditions of the miners and increase their safety. Conversion of the mines to degasification and complete dust removal was finished. A large number of permanent cooling units and movable air conditioners were installed in the mines.

Today a miner's labor productivity in the 15 best mines exceeds 100 tons per month, which is more than double the sector average. These mines include Vorgashorskaya of the Vorkutaugol' Association (146.4 tons/month), Podmoskovnaya of the Novomoskovskugol' Association (141.1 tons/month), Zyryanovskaya in the Kuznetsk Basin (123.2 tons/month) and imeni Kuzembayev in the Karaganda Basin (108 tons/month). This is an example of competent engineering and of a creative search for the reserves for raising labor productivity.

But at the same time, despite the results that have been achieved, all possibilities for surmounting obstacles in development of coal industry were not fully utilized. A number of the 11th Five-Year Plan's quotas concerned with construction, reconstruction and reequipment of the enterprises were not fulfilled. Progressive equipment is still being introduced too slowly, and serious shortcomings in the organization of production and labor are being condoned.

Because of the low rate of construction and reconstruction, the total capacity of the mine fund decreased in 3 years of the current five-year plan. Some of the enterprises are not making the necessary amount of effort to deepen shafts and prepare new horizons.

The intensity of the work of coal industry enterprises is connected to a significant extent with the continually growing complexity of the mining and geological conditions. Each year the depth of development of the mines increases by an average of 8-10 m. In 1983 it attained 475 m, in the Donets Basin it was 630 m, and it exceeded 1,000 m at 22 mines. Over 70 percent of the coal is extracted from mines experiencing the danger of gas and sudden blowouts. At many mines with such conditions, the working faces are being mined in one or two shifts while a special shift is singled out for preventive measures.

The high rate of development of open pit coal mining based on wide introduction of progressive procedures and mine transportation equipment of high unit output capacity made it possible to mine 288.8 million tons of coal from the open pits in 1983 (107.4 percent of the 1980 level) and increase the proportion of this method with respect to total extraction volume to 40.8 percent.

Special attention must be devoted to hastening development of open pit coal mining in the country's eastern regions. Growth in open pit coal mining was achieved both by placing new capacities into operation and by introducing the achievements of science and technology into production. Deliveries of highly productive mining and transportation equipment to open pits increased in the current five-year plan: draglines with bucket capacities of 20 and 40 m<sup>3</sup>, mechanized shovels with a bucket capacity of 8 m<sup>3</sup> and more, rotary excavators with a productivity of 1,250-5,000 m<sup>3</sup>/hr, large dump cars and dump trucks.

Reequipment of the open pits made it possible to increase the volume of overburden removal by 16 percent in the last 3 years. The proportion of coal mining using continuously operating equipment was increased to 44.2 percent. High production effectiveness indicators were attained at new and modernized

open pits. Labor productivity per miner attained 1,312 tons/month at the Bogatyr' open pit in Ekibastuz and 1,458 tons/month at the Azeyskiy open pit in Irkutsk Oblast.

But a number of the quotas associated with developing and increasing the technical level of open pit coal mining are not being fulfilled, or they are being fulfilled late. Not all production associations have taken the necessary steps to make maximum use of the potential of existing enterprises. Many open pits are not fulfilling their coal mining plan or assimilating production capacities, and the coefficient of use of the calendar time of excavators and dump trucks is low.

The rate at which production effectiveness increases and labor productivity grows depends in many ways on how quickly and decisively the shortcomings existing in the work of the associations and enterprises are corrected. This is why engineers and technicians must channel their efforts into improving mine management and into concentrating and intensifying production at both mines and open pits. Mine builders and operators must insure unconditional fulfillment of the five-year plan for introducing coal mining capacities, and their fastest possible assimilation.

Concentration of mining operations--growth of the load on each mine and working face and more efficient preparatory operations and support of mining operations--has always been an important factor in the growth of labor productivity. Its increase in 1971-1974 was responsible for over 35 percent of the total increase in labor productivity. In the current five-year plan a decrease in the level of concentration of mining operations had an unfavorable effect on this indicator. In particular the average daily load on a working face decreased by 4.4 percent in 3 years. An especially large decrease in face load occurred in the Dzerzhinskugol', Sredazugol', Stakhanovugol', Ordzhonikidzeugol', Kiselevskugol' and Chelyabinskugol' associations. Consider this in the light of the fact that a 1 percent decrease in the load on a face means a 0.2-0.3 percent decrease in the worker's labor productivity.

Labor productivity depends directly on the rate and scale of introduction of the achievements of scientific-technical progress. This year the mines will receive 280 complexes of a new technical level, or 60 percent of all of the deliveries. There are plans for increasing the vertical shaft tunneling volume by 2 km over the 1983 level (from 12 to 14 km), for carrying out 55 km of tunneling to expose and prepare working faces, and for preparing an additional 59 working faces. Coal mining by mechanized complexes is to be increased by 5 million tons, while tunneling by combines is to be increased by 112 km. Fifty-two new horizons will be placed into operation as a result of the increase in volume of major tunneling operations.

Additional steps must be taken to increase the production capacities of coal machine building. This can be done through reequipping, reconstruction and expansion of the plants, by raising the effectiveness with which fixed capital is used and by introducing advanced procedures. As a result of implementing these measures, the output of mining complexes of a new technical level will increase to 72 percent in 1985.

Sixty-four highly productive excavators, 104 locomotives, 720 dump cars and 126 units of industrial motor transportation must be placed into operation at the open pits. The increment in coal mining by rotary excavators must be 7.9 million tons. Introduction of new progressive equipment will make it possible to assimilate newly introduced output capacities of 14.7 million tons at the Neryungrinskiy, Azeyskiy, Tyul'ganskiy and other open pits.

Scientific research, planning and design institutes are called upon to play an important role in solving the problems of hastening scientific-technical progress. But the help being provided by scientists and specialists to the enterprises is still inadequate. Every institute must participate more actively in solving the problems of raising the technical level of production, improving product quality and reducing manual labor. We need to update the programs of scientific research, planning and design in order that every job completed by an institute would have concrete significance and promote an increase in production effectiveness.

Organizational factors have special significance to growth in labor productivity. Sensible use of equipment, machinery, manpower and other resources is one of the reserves for increasing this indicator.

The mines and open pits are receiving increasingly larger amounts of highly productive equipment, but it is not being used properly everywhere. In 1983 for example, the level of use of the pool of mechanized supports was 71.4 percent, while the standard required 73 percent. Even this deviation from the standard, which might seem insignificant at first glance, is equivalent to a loss of 5 million tons of coal.

To solve this problem engineers and technicians at all administrative levels must show concern primarily for hastening development of mine management and of the repair base, for raising the level of planning and production discipline and for accelerating and improving the quality of assembly-disassembly operations.

Improvement of the technical state of complexes is a great reserve for raising their productivity. In order that this reserve could be utilized, the technical and mechanical power services of the associations and mines must insure timely and quality fulfillment of overhauls and current repairs, delivery of spare parts and operation of equipment in conditions corresponding to its technical characteristics.

Association and mine executives must get together with personnel at lower managerial levels and focus special attention on raising the level of organization, improving order and raising production and labor discipline in order to achieve a dramatic decline in avoidable idleness of mechanized complexes and tunneling combines during work time (transportation problems, use of workers for incidental jobs and so on).

Significant reserves for raising labor productivity are contained in the way manpower is utilized. The number of personnel being hired by the sector's enterprises has increased owing to an increase in wages. It is important to



place these personnel in the decisive sections of production and achieve an effective return. We cannot condone cases where laborers are diverted from their principal jobs, absenteeism and other losses of work time; we need to improve timekeeping and strictly punish persons who violate work schedule discipline.

Steps must be taken to organize effective control over standardization and payment of wages at the mines and open pits, and to systematically analyze extra payments made above and beyond the wage rates and not associated with production of the end product. More attention must be devoted to standardizing the relationships between growth of labor productivity and average wages, and to making wider use of progressive forms of labor standardization, including collective ones.

One of the effective ways of utilizing the organizational reserves for growth in labor productivity is active dissemination of the best work experience of the enterprises, brigades and sections, and especially of collectives competing to extract 1,000 tons or more coal per day from a single stope. These collectives represent 40 percent of all underground mining and only 15 percent of the total number of workers employed at working faces. We were unable to increase the number of thousand-ton brigades in recent years (1981--418 brigades, 1982--441, 1983--427), even though the quantity of coal and shale they mined grew (1981--178.7 million tons, 1982--179.5 million tons and 1983--181.8 million tons). In 1984 the number of thousand-ton brigades is to be increased to 495, the number of high-speed tunneling brigades at mines is to be raised to 615, and the number of high-productivity excavator and transportation brigades at open pits is to be increased to 913.

The collectives of 18 mine sections suggested a good initiative at the beginning of the current year. They adopted a counterplan, having decided to exceed the planned level of labor productivity by 3-10 percent, and to reduce coal mining cost by 1 percent below the planned level. There is great significance to spreading this patriotic initiative throughout the entire sector. It would be sufficient to point out that just a 1 percent increase in labor productivity would be equivalent to increasing coal extraction by 7 million tons, while a 0.5 percent decrease in cost would make it possible to save 49 million rubles of state assets.

Headed by USSR State Prize laureate A. Overchenko, the tunneling brigade of the Mine imeni M. V. Frunze of the Roven'kiantratsit Association adopted the counterplan of raising labor productivity by 10 percent and reducing cost by 1 percent. An analysis of the organizational, technical and social measures which made it possible for the brigade to adopt such a high counterplan would lead to the conclusion that the possibilities for attaining higher levels are available at all enterprises and in every labor collective.

The Stakhanov movement, which had its beginning in coal industry and which spread extensively throughout the entire country as a competition to achieve the highest labor productivity, celebrates its 50th anniversary in August 1985. In commemoration of this date, laborers of the Torezantratsit Association's Torezskoye Mine Administration, where A. G. Stakhanov had worked for many years, pledged to surpass the hard coal mining plan by 200,000



tons, exceed planned productivity by 1.5 percent and reduce the cost of fuel extraction by 0.5 percent by the end of the five-year plan. Mining and tunneling brigades and mine transportation workers joined a competition being waged under the slogan "Fifty Shock Ten-Day Work Periods in Honor of the 50th Anniversary of the Stakhanov Record!"

The governing board of the USSR Ministry of Coal Industry and the Presidium of the Central Committee of the Trade Union of Coal Industry Workers enthusiastically approved the patriotic initiatives of the leading collectives and took steps to disseminate them throughout the entire sector.

Active introduction of the brigade form of labor organization and stimulation must become the most important direction for raising production effectiveness. In 3 years of the 11th Five-Year Plan the number of workers in brigades climbed from 49.4 to 63 percent. Over 65 percent of the workers in brigades receive wages based on the end results of their labor. Wages are distributed with a consideration for the coefficient of labor participation in over 30 percent of the brigades. The percentage of piece-workers who are now being paid on the basis of standard quotas increased from 18 to 27.3.

It should be noted that numerical growth of brigades is not accompanied in all places by an increase in their work effectiveness. Although the number of brigades failing to fulfill the plan has decreased, it continues to be sizable, especially in associations of the Ukrainian SSR Ministry of Coal Industry, the Kuzbassugol' All-Union Production Association and the Karagandaugol' Association. Much attention should be devoted to developing standard plans for brigade organization of labor, for norms and for standards, and to special training of brigade leaders.

Creation of enlarged complexes consisting of mining sections and motor vehicle columns was a positive factor in the Kuznetsk Basin. These collectives, which are united by a common plan and a single bonus payment indicator, consist of two brigades--a mining brigade (based on a mining section) and a transportation brigade (based on a motor vehicle column). Introduction of three such complexes at the Chernigovskiy open pit of the Kemerovougol' Association made it possible to raise excavator productivity by an average of 22.4 percent in 1983. For the first time the open pit surpassed its annual plan for coal mining and overburden removal using motor transportation. Considering that overburden removal is falling behind at open pits of the Kuznetsk Basin, this new form of labor organization will promote an increase in production effectiveness and growth in coal mining volume.

Labor effectiveness is directly dependent on the qualification level of the personnel. As a minimum we need to double the number of graduates from the system of vocational-technical schools and raise the quality of worker training in the 11th Five-Year Plan with regard for the requirements of technical progress. We need to prepare workers of a wide profile, so that better conditions could be created for raising the effectiveness of the brigade form of labor organization on the basis of interchangeability and fuller utilization of work time.

Significant possibilities for raising labor productivity exist not only at coal mining enterprises but also at machine building and mine repair plants, in capital construction and at concentration and briquetting factories.

The labor productivity of workers in concentration factories was 579 tons per month in 1983, which was 1 percent higher than the 1980 level. Insufficient growth of labor productivity is a consequence of underloading of concentration factories with raw material, shortcomings in repair organization, equipment breakdowns, and slow rates of reequipment and reduction of manual labor. We need to take steps to correct these shortcomings as quickly as possible.

Coal machine building plans to raise labor productivity by 18.4 percent in the current five-year plan; this includes a 22.2 percent increase in enterprises of the Soyuzuglemash All-Union Production Association. In 1981-1983 the association's labor productivity increased by 19.5 percent, as compared to the planned increase of 16 percent. We must see that all of the association's plants fulfill their plan for standard net production and for growth in labor productivity, and that they make full use of the reserves of the brigade form of labor organization.

Workers in capital construction must achieve the 18 percent increment in labor productivity targeted for the 11th Five-Year Plan, primarily by utilizing new construction materials, structures and highly productive machinery, and improving labor organization.

The collectives of the sector's enterprises and associations adopted counterplans of 0.9 percent for growth in labor productivity and 0.5 percent for cost reduction in 1984. The strictest possible observance of production, planning and labor discipline, wide use of advanced forms and methods of labor organization, maximum utilization of available reserves, higher responsibility for assigned work at every work station and development of the socialist competition in honor of the 50th anniversary of the Stakhanov movement are the main prerequisites for fulfilling adopted pledges concerned with increasing coal extraction and labor productivity.

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## COAL

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### NEW EQUIPMENT, METHODS RAISE COAL MINING PRODUCTIVITY

Moscow UGOL' in Russian No 9, Sep 84 pp 21-24

[Article by Ukrainian SSR Minister of Coal Industry N. K. Grin'ko: "Making Fuller Use of the Reserves for Raising Labor Productivity"]

[Excerpts] CPSU Central Committee general secretary, Comrade K. U. Chernenko noted in his speech at an election campaign meeting of voters of the Kuybyshev election district in Moscow on 2 March 1984 that successful forward motion in implementing social programs requires stable, dynamic growth of the economy, and primarily of its effectiveness.

This is especially important to Ukrainian SSR coal industry, which is typified by a predominance of the underground method of coal mining and by high labor-intensiveness owing to the growing complexity of mining conditions due to the constantly increasing depth of mining.

The most important factors predetermining the level of labor productivity in the sector are the structure and condition of the mine fund. In Ukrainian SSR coal industry, 59.9 percent of the mines (technical units) experienced no development in the last 15-20 years. Some of these mines will stop production in the future because of depletion of the reserves, and because of worsening mining and geological conditions, the output capacity of the remaining mines will decrease.

At these mines, labor productivity increased by 28.5 percent in 1965-1975, which was responsible for a 25.4 percent rise in this indicator for the sector as a whole. Growth in labor productivity in 1965-1975 was achieved primarily as a result of concentration of production on the basis of reequipment of the mines; this effort dominated over other factors which reduced the labor productivity of underground coal mining.

A further increase in mining depth and exhaustion of the areas of application of series-produced mining complexes had an even greater influence on the work of the mines in the 10th Five-Year Plan.

Conversion to a five-day work week at the mines and reduction of the work week from 36 to 30 hours required a 6.2 percent increase in the number of laborers, with no increase in coal mining volume resulting; this reduced labor productivity by 4.8 percent in the sector as a whole.

As a result the mines which did not enjoy development experienced a 22 percent drop in labor productivity in 1975-1980, and a 14.4 percent drop in 1980-1983. The negative influence of these mines upon the overall work indicators could not be compensated by the developing mines.

Growth in labor productivity is being retarded by the low rate of renewal of the mine fund in the presence of constantly more complex conditions for working the coal deposits. The output capacities of new mines decreased in the 10th Five-Year Plan to 2.8 million tons, as compared to 40.5 million tons in 1961-1965 and, correspondingly, 14.6 and 12 million tons in the 8th and 9th Five-Year Plans.

Capacities capable of mining 8.2 million tons will be introduced into the mines and construction of one open pit with a capacity of 2.1 million tons will begin in the 11th Five-Year Plan. As in the previous five-year plans, the decrease in output capacities in 1981-1985 will far outstrip commissioning of new capacities.

In the future, 59 coal enterprises will deplete their reserves. Reduction in coal extraction for this reason is presently being kept at bay owing to sectioning [prirezaniye] of the reserves of the closing mines without implementing the necessary measures for developing and improving mine management. In 1970-1983 1.9 billion tons of reserves were subjected to prirezaniye at the mines in 328 cases (this is an average of 6 million tons per enterprise).

Complexes series-produced by coal machine building plants are intended primarily for seams over 1.2 m thick, while the bulk of the reserves (84.3 percent) consist of thin seams. The share of coal mining by mechanized complexes is 45.1 percent at seams up to 1.2 m thick, and 80 percent at seams over 1.2 m thick.

Over half of the coal extracted by mechanized complexes comes from seams over 1.2 m thick, in which only 15.7 percent of all reserves are concentrated.

Intensive working of such seams led to a situation where the range of effective application of series-produced complexes was practically exhausted by the beginning of the 10th Five-Year Plan. Further expansion of the volume of their introduction occurred primarily either under unfavorable conditions or in conditions that were not fully in keeping with the technical characteristics of this equipment. As a result the load on the working faces decreased by a factor of 1.3, while growth of the level of fully mechanized coal mining decreased from 6-7 percent to 1.4 percent in a year.

The depth of development in mines of the Ukrainian SSR Ministry of Coal Industry increased from 337 m in 1960 to 530 m in 1984. The number of mines working coal seams with a high gas content is constantly increasing as the mining depth increases. While in 1965 the proportion of mines in category III, mines outside the category range and mines carrying a danger of sudden blowouts of coal and gas was 58.7 percent, in 1984 it attained 74.8 percent. In this period the absolute methane abundance in extraction sections and at working faces more than doubled, while that at shortwalls increased by a time and a half.



The danger of blowouts in mining operations increased significantly. Thus while in 1977 there were 86 mines working seams that were prone to sudden blowouts of coal and gas, in 1984 their number climbed to as much as 154, while the number of single-seam mines prone to sudden blowouts of coal and gas increased from 160 to 565.

The thermal conditions of mining are also growing worse. While in 1965 this problem hardly existed in the Donets Basin, today more than 100 mines require special measures to reduce the temperature of mine air.

Increasingly larger quantities of air must be fed into working faces and shortwalls as the mining depth increases and as rock temperature and gas release increase consequently. Moreover deformation of rock around drifts increases, especially within the zone affected by mineral extraction. Improvement of ventilation and support of mineral extraction require continual enlargement of the cross section of the work areas. In this connection the cross section of all preparatory tunnels was increased by 8.8 percent during the 10th Five-Year Plan (from 6.8 to 7.4 m<sup>2</sup>). This tendency is also persisting into the 11th Five-Year Plan.

Because transportation and ventilation systems grow more complex as deeper horizons are worked, the length of maintained mine tunnels increased by a factor of 1.2 in 1983 as compared to 1970 (from 12,700 to 15,100 km). In this case although the length of tunnels not corresponding to the standards did decrease from 15 to 12.8 percent, it is still over 1,900 km.

To improve ventilation of the tunnels and reduce the danger of blowouts, in 3 years of the current five-year plan the ventilation systems of 40 mines were reconstructed, 13 shafts were tunneled, 36 large-diameter wells were drilled, 96 new main ventilation fans were installed and 77 were replaced by more powerful ones, and all gas-contaminated shafts were outfitted with gas safety apparatus. Permanent cooling units were placed into operation at 23 mines. The number of mobile mine air conditioners in the mines was raised to 210.

The republic's mines began to intensively introduce equipment in the 11th Five-Year Plan to work seams less than 1.2 m thick. In 1983, 62 stopes working thin seams were equipped with KM-87UM complexes, while 71 stopes were equipped with KM-88 complexes. Introduction of the new LKM-103 complexes has begun. The number of stopes equipped with scraping units increased to 88; these stopes mine 8.1 million tons of coal.

The collectives of over 100 mines in the Ukrainian SSR achieved an increase in labor productivity in 1983 over the 1982 level owing to implementation of reequipment measures and measures to improve labor organization. The objective of these measures is to achieve prompt preparation of working faces, reduction of the labor-intensiveness of production processes, improvement of the quality of technical maintenance and repair of equipment, and reinforcement of labor and production discipline.

Despite the increase in mining depth, the worsening of mining and geological conditions and complication of the transportation and ventilation systems,



the Donetskugol', Krasnoarmeyskugol', Shakhterskantratsit, Sverdlovantratsit and other associations surpassed the labor productivity plan for 1983.

The Krasnoarmeyskugol' Association was successful owing to an increase in the proportion of coal mined from fully mechanized stopes to 94 percent, an increase in the proportion of work done by tunneling combines to 64 percent, and a 1.2-time increase in the load on the fully mechanized stope since the beginning of the five-year plan.

At the Sverdlovantratsit Association's Mine imeni 60-Letiye SSSR, which mines seams 0.9-1.2 m thick, the level of coal mining by complexes was raised to 100 percent, the proportion of mechanized rock loading increased by 10 percent in comparison with the 1982 level, and the rate of preparatory tunneling increased by 15 percent, climbing to an average of 100 meters per month. Four mining brigades are working with an average longwall daily load of 1,000 tons and more, eight are working with a load of over 500 tons per day, and seven brigades are doing their preparatory tunneling at high speed. In 1983 the labor productivity of a coal mining worker was 51.7 tons per month, and it increased 5.9 percent over the 1982 level. The cost of 1 ton of coal was reduced by 41 kopecks more than planned.

Improvements in production procedures applied to existing mechanized coal mining resources provides a tangible result in raising labor effectiveness. As an example a working face miner brigade led by B. P. Livitskiy at the Makeyevugol' Association's Mine imeni V. M. Bazhanov used a second 1K-101 combine in its KMK-97D complex to work a seam 0.85 m thick. The drive systems of their SP-63M cutting conveyor were positioned in drifts, and the combines cut into the seam by means of oblique approaches. This procedure made removal of coal without the need for cutting recesses possible. Six workers previously employed to prepare such recesses were freed for other work. The load on the longwall was increased by 15 percent to 570 tons per day, and labor productivity increased by 20 percent.

Using a Donbass complex and a 1K-101 combine, the working face miner brigade led by A. I. Tkhor at the Roven'kiantratsit Association's Mine imeni M. V. Frunze is working a seam 1.1-1.2 m thick. The workers are positioned frontally in the stope. As a result the rate of coal removal increased by 20 percent, and the complex's down time decreased by a factor of 1.3. The coefficient of labor participation is used to distribute wages among the brigade's workers. An experienced mentor is assigned to every new worker. The brigade's composition is stable. Timely preparation of new stopes to replace depleted stopes has been organized. This was possible owing to efficient redistribution of the section's workers between coal mining processes and tunneling. As a result Tkhor's brigade increased its daily coal extraction by 11 percent in 1983 as compared to 1982, raising it to 1,100 tons. Labor productivity increased by 17 percent.

Work is well organized in the mining section led by V. I. Premud (integrated brigade leader, A. A. Klyavin) at the Dobropol'ugol' Association's Dobropol'yeskaya Mine. In order to achieve a sizable rate in the stopes' advancement (over 5 meters per day) in this section, coal is loaded from the

cutting conveyor to a PTK-1 movable loader, and then to a 1LT-80 telescopic conveyor. A hopper container was set up in the transportation link.

The section collective supplies some of its miners from the working face and its electricians to the tunneling and assembly brigades in order to monitor the quality with which new stopes are prepared and equipment is assembled, and to insure that these stopes go into operation promptly. These individuals acquire the skills of operating and repairing the equipment right at the stope in which they would be working later on. An enlarged repair team was organized in the section, and technical maintenance and repair of equipment using work orders, repair and preventive maintenance cartograms and technical service cards was organized. Current equipment repairs predominantly involve preventive replacement of assembly units. In order to maintain control over the condition of the equipment in mining sections and over replacement of assembly units, a control and repair brigade was organized under the mine's mechanical power service. This brigade services the underground sections once a week according to a schedule.

This organization of production in the section promoted a 20 percent increase in the load on the longwall (to 1,230 tons per day) and a 20 percent increase in labor productivity (to 310 tons per month).

A brigade led by G. G. Matveyev at the Shakhterskantratsit Association's Vinnitskaya Mine achieved good results. In August 1983 it tunneled a distance of 1,011 m. Labor productivity per tunneler was 12.3 m/month.

By the end of 1984, 62 complexes of a new technical level will be put into operation at seams with a slope of up to 35 degrees (KM-103, 1KM-88, KMT, KD-80, UKP); 22 UST-2M and SO-75 scraping units will be placed into operation as well. Fifteen tunneling units and supports and 10 Poisk combines will be introduced at steep seams. Use of hydraulic props with a closed hydraulic system and a higher operating resistance of 300 kilonewtons, and of externally powered hydraulic props with a working resistance of 300 kilonewtons will expand at longwalls stabilized by individual supports. The pillar mining system and ascending longwalls will come into wider use. Reinforcement of roofing rock by chemical anchoring and chemical hardening solutions will enjoy wide application (at 175 longwalls). Arched supports made from low alloy steels and unified supports will be used intensively at steep seams; metallic supports characterized by high resistance in pliable mode, anchoring supports, filling gaps in the supports with hardening compounds and protection of shortwalls during pillarless mining will be introduced as well.

Another 43 combines (4PP-2, KN), 30 drilling rigs (Strela-77, B100-200, B-68K) and 15 Titan crushing-loading complexes are to be introduced into preparatory operations.

Use of contour blasting in tunneling employing the blast hole drilling method is widening, as is the use of double stepped notches. A procedure involving preliminary digging of relief slots will be introduced for seams with a blowout hazard.

The number of PS-3.5 sectional trains, ARP-14 heavy electric locomotives, VDK-2.5 cars, ground-level roads and monorails, and production systems with a coal and rock accumulation stage will be increased in underground transportation.

To improve the working conditions of miners, TVD-175 mine liquid heat exchangers will be used to cool air entering the mine, the number of Veterok-3 air circulating units will be increased, complete dust removal and degasification using the method of forcing water into the seam at high pressure will enjoy further development, and integrated plans for mechanizing auxiliary processes and manual labor will be implemented at the mines.

The following has been planned as ways of achieving more effective use of equipment: expanding the volume of panel and horizon methods of preparing gently sloping and sloped seams; promoting predominantly pillarless preparation of mining sections, to include digging section tunnels at an angle to a worked space and reuse of such tunnels; increasing the number of completely protected stopes at seams offering a blowout hazard; widening the use of the pillar mining system in which coal is mined up-grade and by bearing; accelerating transition to on-site preparation of cutting sections, and employing anticipatory completion of relief longwalls in order to locate the principal drifts in relief zones.

In addition to this we need to find new nontraditional methods of breaking down rock (hydromechanical, pulse, vibrational) and new methods of controlling the condition of rock with an eye on degasification when working seams and rock offering a blowout hazard (physical, chemical, biological and other methods). Scientific research institutes of the USSR Academy of Sciences and the Ukrainian SSR Academy of Sciences could provide help to coal industry in solving these problems.

Thirteen percent of the planned growth in labor productivity is to be achieved by concentration of mining operations, while 24 percent is to be achieved by improving the organization of labor and production.

Efforts are being made to set the work-schedule of the workers in order, to develop brigade forms of labor organization and wages, and to improve labor standardization. As a result there were 37.1 percent more brigades in 1983 than in 1980.

Today 390,100 industrial workers are organized into 20,306 brigades, each with a stable number of workers--19-20 persons. Brigade councils that resolve all production and social issues have been created in 8,329 brigades.

The number of integrated brigades grew from 6,681 to 9,682; this includes an increase in the number of start-to-finish integrated brigades from 3,349 to 4,464.

The number of piece-workers employed by brigades paid on the basis of a single order increased significantly (from 202,700 persons in 1981 to 251,900 persons in 1983). The proportion of these brigades in the total

number of brigades in which wages are based on piecework and a piecework-bonus pay system is 95.9 percent, while the proportion of workers in these brigades being paid in this fashion is 97.2 percent. The number of brigades using the time and the time-bonus pay systems increased in 1983 from 5,461 (the 1980 figure) to 9,314, while the number of persons in such brigades increased by 60,800, or by 85.6 percent.

The number of brigades in which wages are calculated on the basis of a standard quota tripled since 1981 (from 1,583 to 4,884), while the number of workers in such brigades increased by a factor of 3.6.

A consistent effort is being made to increase the number of brigades using the coefficient of labor participation to distribute wages among brigade members. Thus in comparison with 1981, the number of brigades using the coefficient of labor participation in 1983 increased from 3,939 to 6,292 or by 1.6 times (for brigades using the piecework and piecework-bonus pay system) and from 206 to 535 or by 2.6 times (for brigades using the time and time-bonus pay system).

An investigation into the work experience of mines exhibiting high labor productivity was organized. Schools for disseminating the best experience were held at such mines with the participation of directors, chief engineers, chief mechanics, deputy directors for production and section chiefs of mines working in similar mining conditions.

Implementation of these measures will make it possible to alter the unfavorable trend that established itself in recent years in the dynamics of labor productivity, and to insure that the plan for this indicator would be exceeded by 1 percent.

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# COAL

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## HIGHER LABOR PRODUCTIVITY SOUGHT IN OPEN PIT MINE CONSTRUCTION

Moscow UGOL' in Russian No 9, Sep 84 pp 38-40

[Article by USSR Deputy Minister of Coal Industry A. A. Pshenichnyy: "Raising Labor Productivity in Construction"]

[Excerpts] In a time of intensifying social production, growth in labor productivity is one of the main directions of insuring a high rate of economic growth. Special attention is devoted to this issue in construction.

Utilization of progressive methods and the advanced skills of construction acquired both in coal industry and other sectors of the national economy were foreseen in the creation of facilities at the Ekibastuz and Kansk-Achinsk fuel and energy complexes and the Southern Yakutsk coal complex.

The plans for construction of open pits, which are based on scientific, planning and design studies, foresee the use of highly productive transportation and dumping systems in support of mining operations. Rotary complexes and conveyor transportation are included in these plans. The working of deposits by ERP-2500, ERShRD-5250 and SRs(k)-2000 rotary excavators in integration with conveyor transportation as far as the unloading point makes flow line production possible and minimizes the material and labor outlays while keeping labor productivity high (Table 1).

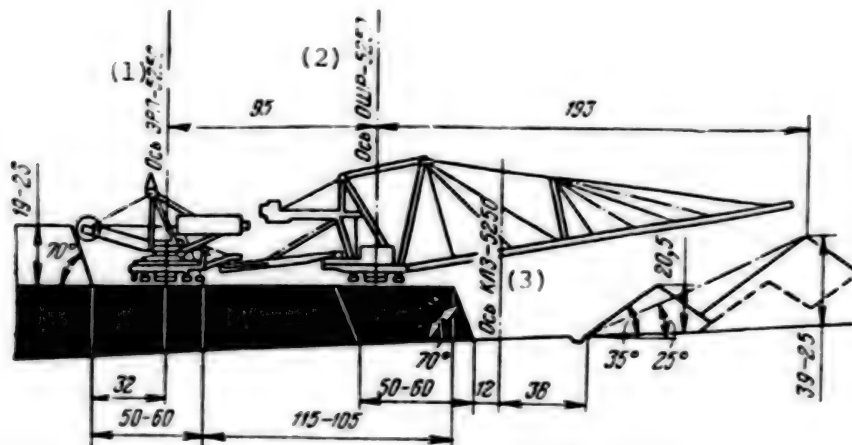
Table 1

Indicator	For USSR Ministry of Coal Industry as a Whole	Vostochnyy	Open Pits	
			Borodinskiy, Berezovskiy, No 2	No 1
Labor productivity, tons/month	428	1,472	1,680	2,740
Cost of 1 ton of coal, rubles	4.4	1.66	1.98	1.25

Overburden is removed from these open pits by excavators with high unit output capacity--EKG-12.5, EGK-20, ESh-20/90, ESh-40/85. Use of ERShRD-5250 and



ERP-5250 rotary excavators in coordination with a transloader, a spreader and a system of conveyors is also foreseen (see figure). The height of the overburden bench is 30 m, and the width of the progress cycle is 60 m. This means a productivity of 11-12 million  $m^3$  per year for the complex.



Removal of overburden by an ERP-5250 excavator, an OShR-5250/190 spreader and a system of conveyors for loose rock

Key:

- |                      |                     |
|----------------------|---------------------|
| 1. Axis of ERP-5250  | 3. Axis of KPZ-5250 |
| 2. Axis of OShR-5250 |                     |

All buildings of the surface complex are unified. The space planning concepts are based on the principles of locating the buildings close to the production processes and minimizing elevation differences. The design concepts suggest excluding laborious processes such as erecting a brick yard, laying monolithic reinforced concrete and so on to the extent possible.

In order that the construction operations could be carried out by industrial methods, all of the single-story industrial buildings are planned out of metallic fully prefabricated structures. A decrease in building weight is achieved by using effective construction structures and materials, and steels of higher strength classes. Owing to this the buildings can be assembled out of larger modules, which reduces the labor-intensiveness of assembly operations by 12-15 percent in comparison with construction of buildings out of reinforced concrete.

Truck-mounted concrete mixers and concrete pumps and other highly productive equipment is used to erect monolithic reinforced concrete structures using a sliding form in the construction of facilities in the Yakutsk ASSR and at the Kansk-Achinsk fuel and energy complex. Use of a sliding form raises the labor productivity of the workers by 1.5-1.7 times.

In order to reduce the labor-intensiveness and cost of construction and improve the conditions for operating production pipelines, the heating pipelines are planned and constructed with metallic and prefabricated reinforced concrete supports. Power cables are laid on special metallic decks, and guy rope systems are used to support utility lines crossing over roads and railroads.

Use of progressive concepts just in the construction of the Krasnoyarskugol' Association's Berezovskiy open pit made it possible to reduce labor-intensiveness of assembly operations by 50,000-55,000 man-days, and the cost of construction by 3.5-4 million rubles.

The SoyuzstroyTEK [not further identified] is devoting special attention to the brigade contract, which has become the principal form of work both in the construction of industrial buildings and structures, housing, social and cultural facilities, and in mine tunneling operations. The brigade contract eliminates shortcomings in the organization of construction and unsatisfactory use of construction and tunneling equipment, and it reduces shift losses of work time and personnel turnover (Table 2). The average indicators for labor productivity are 10-15 percent higher in brigades using the contract method than in ordinary brigades.

Table 2

Комбинат (1)	Удельный вес численности работающих по бригадному подряду от общей численности сдельщиков, % (2)	Объем работ, выполненный по бригадному подряду, млн. руб. (3)	Удельный вес объема СМР, выполненных по бригадному подряду, от объема СМР, выполненных собственными силами, % (4)
СоюзстройТЭК(5)	$\frac{25,2}{27,7}$	$\frac{52,1}{65,2}$	$\frac{35,7}{39,6}$
В том числе: (6)			
Якутуглестрой (7)	$\frac{21,9}{27,4}$	$\frac{33,6}{39,7}$	$\frac{35,2}{39,1}$
Экибастушахто-строй(8)	$\frac{33,1}{31,6}$	$\frac{11,1}{14,5}$	$\frac{40,5}{43,4}$
КАТЭКуглестрой (9)	$\frac{26,7}{29,3}$	$\frac{6,2}{10,2}$	$\frac{33,5}{40,1}$

Note: Numerator--1982 data, denominator--1983 data.

Key:

- |   |                               |
|---|-------------------------------|
| 1. Combine  | installation jobs carried out |
| 2. Proportion of brigade contract workers with respect to total pieceworkers, %   | using in-house manpower, %    |
| 3. Volume of jobs performed on basis of brigade contract, million rubles  | 5. SoyuzstroyTEK              |
| 4. Proportion of construction and installation jobs carried out on basis of brigade contract with respect to volume of construction and | 6. Including:                 |
|   | 7. Yakutuglestroy             |
|   | 8. Ekibastuzshakhtostroy      |
|   | 9. KATEKuglestroy             |

Table 4

<u>Combine</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>
SoyuzstroyTEK	10 816 12 175 13 289		
To include:			
Yakutuglestroy	13 017 14 391 15 694		
Ekibastuzshakhtostroy	8 698 10 413 11 478		
KATEKuglestroy	9 048 10 451 12 069		

The sector's scientific research and planning institutes and construction organizations of the SoyuzstroyTEK carried out a great deal of work to improve engineering preparations for production and organization of construction jobs. The indicators for labor productivity achieved per worker are given in Table 4 (in rubles).

Just in 1982-1983 the Ekibastuzshakhtostroy and KATEKuglestroy combines raised labor productivity by 32-33 percent.

Considering the growing volume of construction, the USSR Ministry of Coal Industry is foreseeing efforts to raise the technical level of construction in the plans of scientific research and planning institutes. These efforts should reduce manual labor and improve construction procedures. Special attention is being devoted to the use of light metallic structures and modular buildings as well as built-in rooms delivered to the construction site completely prefabricated. Movable tunneling equipment (hoists, compressor stations, boiler plants and so on) will be widely employed in the construction of drain shafts; standard buildings and structures of the container type will be built to support shafts and construction of horizontal drifts.

The planning of cost estimates is to be improved, which will raise the quality of the planning, architectural and construction concepts, reduce construction cost and decrease the labor-intensiveness of the entire complex of work.

Special attention will be turned to the brigade contract. Introduction of the intersector brigade contract is to promote a reduction in the time of construction of the facilities, and an increase in labor productivity.

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## COAL

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### IMPORTANCE OF OPEN PIT COAL MINING RISES

Moscow UGOL' in Russian No 9, Sep 84 pp 40-43

[Article by A. P. Gridnev, TsNIENugol' (not further identified): "Development of Open Pit Coal Mining"]

[Text] One of the factors determining further technical progress in coal industry is accelerated development of open pit coal mining, the most effective and economical method.

Development of this method is preferred because of its positive effect upon the basic technical-economic indicators of the sector's work: The average monthly labor productivity per miner in 1983 was 413 tons at open pits, which exceeded the level achieved in shafts by 10 times; the cost of mining 1 ton of coal was 4.4 rubles, which is significantly lower than in shafts. Consumption of auxiliary materials and electric power is 4.3-4.5 times less than in shafts. In 1983 288.8 tons [sic] of coal were extracted by the open pit method in the USSR Ministry of Coal Industry. In comparison with 1965, the extraction volume climbed by a factor of 2.1. Its increase was achieved due to construction, reconstruction and reequipment of open pits, which resulted in the introduction of open pit mining capacities capable of producing 173 million tons per year.

The share of open pit mining in total mining climbed from 24.4 to 40.8 percent. This alone resulted in about a 70 percent increment in the labor productivity of miners in the sector as a whole, while the cost of 1 ton of coal was reduced by 1.3 rubles.

Given that the coal mining structure that evolved in 1965 remains constant, to achieve the total extraction volume attained in 1983 we would have to increase the number of workers by almost 200,000, while operating expenses would have to be increased by 1 billion rubles.

An extensive effort is being made in the sector to develop open pit coal mining, primarily in promising basins of the country's eastern regions--Kuznetsk, Kansk-Achinsk, Ekibastuz, Irkutsk and Southern Yakutsk, and in deposits of the Far East.

The dynamics of open pit coal mining (in millions of tons) for the principal basins and deposits in 1965-1983 are characterized by the data in Table 1.

Table 1

<u>Basin, Deposit</u>	<u>1965</u>	<u>1970</u>	<u>1975</u>	<u>1980</u>	<u>1983</u>
USSR Ministry of Coal Industry-total	139.3	164.6	223.9	268.9	288.8
Kuznetsk	22.1	32.4	45.8	52.3	58.7
Ekibastuz	14.3	22.7	45.8	66.5	73.7
Kansk-Achinsk	13.8	18.1	27.6	34.8	38.5
Irkutsk Basin and Transbaikals deposits	18.0	22.0	29.9	35.5	37.6
Far Eastern deposits	14.5	17.3	21.5	25.9	26.8
Ural deposits	34.7	30.5	25.5	23.6	17.4

The most significant growth in extraction in the period following 1965 was attained in the Kuznetsk, Ekibastuz and Kansk-Achinsk basins.

Annual extraction from a single open pit averaged 3.7 million tons in 1983, which is 1.7 times more than in 1965.

There are now 67 operating open pits (77 technical units) in the sector. Among them are the world's largest Bogatyr' open pit with a production capacity of 50 million tons of coal per year, and Borodinskiy--23.5 million tons, Severnyy--22 million tons, Azeyskiy--13.75 million tons and Nazarovskiy--16 million tons. Over 43 percent of total open pit extraction is represented today by open pits with an annual capacity of 10 million tons and more.

Significant changes associated with introducing new types of mine transportation equipment occurred in the procedures used in mining and stripping operations.

Progressive procedures making use of continuous-action equipment--rotary excavators with productivities of 630, 1,250, 2,500, 4,500 and 5,000 m<sup>3</sup>/hr and a unit cutting force of 0.14-0.21 kN/cm<sup>2</sup>--enjoyed wide development in coal mining. In 1983, these procedures were responsible for 44.3 percent of the total volume of open pit mining.

Progressive trends were also noted in the procedures of stripping operations. In the period following 1965 the overburden processing volume increased by a factor of 2.2, attaining 1,113,000 m<sup>3</sup> in 1983.

The area of application of a system not requiring additional transportation and employing excavator-draglines with a bucket capacity of 15-100 m<sup>3</sup> widened; its share in 1983 was 33 percent.

The volume of stripping operations using motor vehicle transportation increased sixfold. The proportion of such operations with respect to the total stripping volume increased from 13.2 to 33 percent. The dump truck fleet was renewed as a result of equipping the open pits with trucks having capacities of 75, 120 and 180 tons. The proportion of rail transportation in the total volume of overburden processing decreased from 41.1 to 28.5 percent.



The rate of development of stripping operations decreased in the 10th Five-Year Plan: While the coal mining volume increased by 20 percent, the volume of stripping operations increased by only 5 percent. Reequipment of the open pits in 1981-1983 resulted in an increase in the rate of development of stripping operations to 116.4 percent (Table 2); this rate now surpasses the development of coal mining (107.7 percent).

Table 2

Indicator	1971-1975	1976-1980	1981-1983
Coal extraction	136	120	107.4
Stripping operations	135	105	116.4
Prepared coal reserves	119	115	89.8
Average excavator bucket capacity	118	106	104.0
Productivity of standard excavator	126	96	101.3

Because open pits of the Kuznetsk Basin were supplied with excavators having a bucket capacity of 16 m<sup>3</sup> and dump trucks with loading capacities of 75 and 120 tons, the stripping volume increased by 63 million m<sup>3</sup>, or by 1.4 times, in 3 years of the current five-year plan.

The commissioning of new open pits and reconstruction and reequipment of existing ones promoted a rise in the labor productivity of open pit coal mining from 255.3 tons per month in 1965 to 413 tons per month in 1983; in this case the most sizable increment (percent increment) was achieved in the 9th Five-Year Plan--in the time of the most intensive development of mining and reequipment of the open pits with highly productive equipment.

In 3 years of the 11th Five-Year Plan the labor productivity of miners in open pits decreased by 7 percent, primarily because the rate at which new output capacities were introduced was low, because highly productive mine transportation equipment was delivered late, because stripping operations were developed preferentially, because coal extraction was increased in regions with complex mining and geological conditions and severe climatic conditions, and for other reasons.

But at the same time growth of labor productivity in open pits is being retarded by organizational factors as well. Twelve open pits failed their extraction plans in 1983. The greatest shortfall was suffered at the Bashkirugol' Association's Kumertauskiy open pit and the Kemerovougol' Association's Krasnobrodskiy, Kolmogorovski and Prokop'yevskiy open pits. Twenty-three open pits were unable to achieve their full output capacity.

The attention being devoted in the associations and open pits to increasing the labor productivity of the workers, improving work organization and making effective use of mine transportation equipment is still inadequate. The coefficient of utilization of the calendar time of excavators in stripping operations was 0.6 in 1983, as compared to the planned 0.71. Over 200 excavators (about 15 percent of the total number) experience unplanned down time each day. Unplanned down time owing to the absence of transportation resources is 28 percent of total down time. In comparison with 1980, excavator productivity decreased by 3.5 percent for the EKG-4.6, by 2 percent for the EKG-8I and by 1.3 percent for the ESh-15/90. The productivity of the main brands of dump trucks was 11-12 percent below the plan, and unplanned down time of rail transportation was 20-25 percent.

While the coal extraction volume of the Ekibastuzugol' Association increased by 10.7 percent between 1980 and 1983 and the volume of stripping operations increased by 7.1 percent, the average monthly productivity of miners dropped in this period by 133.5 tons, or by 13 percent. Use of mine transportation equipment worsened in the association's open pits. The annual productivity of single-bucket excavators decreased by 5.2 percent. This includes a 6 percent decrease for buckets with a capacity of 12.5 m<sup>3</sup>; the annual productivity of locomotives transporting overburden decreased by 2 percent. Unplanned down time of single-bucket excavators was 21 percent, exceeding the sector's average indicator by a time and a half.

In 3 years of the current five-year plan the average monthly productivity of miners decreased by 95 tons or 10 percent at the Krasnoyarskugol' Association's Nazarovskiy open pit. The main reason for this was unsatisfactory use of production equipment. Annual productivity of single-bucket excavators involved in stripping operations decreased by 8 percent, while that of rotary excavators involved in coal extraction decreased by 10 percent.

A significant quantity of obsolete and worn equipment is now being operated at the open pits. Its maintenance requires additional outlays of manpower and materials. Concurrently an increase in excavator bucket capacity from 4.6 (5) m<sup>3</sup> to 12.5 m<sup>3</sup> raises the labor productivity of excavation and spreading by a time and a half; in this case the number of workers involved in auxiliary decreases simultaneously.

All-out dissemination of the work experience of the best collectives and a competition for all-out growth in the effectiveness of the use of mine transportation equipment represent an important reserve for developing extraction and increasing labor productivity at the open pits.

In 1983 the standards for higher equipment productivity were achieved by 890 brigades, including 403 excavator brigades, 134 locomotive brigades and 353 motor transportation brigades. The largest numbers of such brigades are found in the Vostsibugol', Krasnoyarskugol', Kemorovougol' and Ekibastuzugol' associations.

The proportion of excavator brigades that satisfied the standard for higher productivity in the Vostsibugol' Association is 34.4 percent, and the volume

of jobs they perform is 70 percent. The labor productivity of these brigades is twice greater than the association's average.

In the Kemerovougol' Association, the proportion of outstanding motor transportation brigades is 14.4 percent, and their contribution to the total transportation volume is 13.5 percent. V. P. Solov'yev's integrated brigade at this association's Chernigovskiy open pit attained an annual productivity of 2,056,100 m<sup>3</sup> loading overburden into rail transportation using an EKG-8I excavator. This brigade exceeded the average indicator for such machinery by a time and a half.

Yu. M. Chemesov's brigade, which services an ESh-15/90 dragline, successfully satisfied the standard for higher productivity at the Vostsibugol' Association's Cheremkhovskiy open pit. The brigade dumped 4,324,000 m<sup>3</sup> of rock, and the standard set for this type of excavator was surpassed by 1,074,000 m<sup>3</sup>.

An ER-1250 rotary excavator brigade led by V. V. Avtushko at the Krasnoyarskugol' Association's Borodinskiy open pit extracted 3,245,800 tons of coal, while P. V. Cherpakov's brigade, which used the same kind of excavator in this same association's Nazarovskiy open pit, achieved an extraction level of 3,545,000 tons of coal (compare this with the standard of 2,800,000 tons).

Creation of integrated mine transportation brigades servicing an excavator, a drilling rig, a bulldozer and dump trucks was an important direction in the development of the brigade form of labor organization. The results of the very first months of the work of these brigades demonstrated their high effectiveness. This form of production organization creates favorable conditions for fuller utilization of available reserves and for significant growth of labor productivity.

The work experience of an enlarged integrated brigade (a combination of a mining section and a motor vehicle column) at the Kemerovougol' Association's Chernigovskiy open pit deserves attention. Created in January 1983, this brigade increased its annual volume of processed rock by 22.1 percent as a result of a decrease in the down time of dump trucks by a third. Such enlarged brigades are presently being created by the association in the Kiselevskiy, Kedrovskiy and Tomusinskiy open pits.

The highest labor productivity indicators for miners were achieved at the Ekibastuzugol' Association's Bogatyr' open pit (1,312 tons per month) and at the Vostsibugol' Association's Azeyskiy open pit (1,458 tons per month), which are three times greater than the average labor productivity at open pits in the sector as a whole.

The most important program document spelling out the tasks of coal industry workers is the CPSU Central Committee and USSR Council of Ministers decree "On Additional Measures to Accelerate Development of Open Pit Coal Mining in 1981-1990" adopted in 1981. This decree foresees:

extraction of 315 million tons of coal by the open pit method in 1985, and 390-400 million tons in 1990;

completion of 1,200 million m<sup>3</sup> of stripping operations in 1985, and 1,500 million m<sup>3</sup> in 1990;

the commissioning of coal mining capacities at the open pits totaling 68.6 million tons in 1981-1985, and 120 million tons in 1986-1990;

initiation of the construction and reconstruction of open pits with a total output capacity of 80.9 million tons of coal per year in 1981-1985.

The USSR Ministry of Coal Industry, the production associations and the enterprise collectives developed and are now implementing specific measures aimed at fulfilling these tasks. Special attention is being devoted to hastening development of open pit coal mining in the country's eastern regions.

Deliveries of highly productive mining and transportation equipment to open pits increased in 1981-1983: draglines with bucket capacities of 20 and 40 m<sup>3</sup>, mechanical shovels with bucket capacities of 8-20 m<sup>3</sup>, rotary excavators with a productivity of 1,250-5,000 m<sup>3</sup>/hr, high capacity dump cars, and dump trucks with loading capacities of 75, 120 and 180 tons.

But at the same time it should be noted that a number of the quotas for developing and increasing the technical level of open pit coal mining are not being fulfilled, or they are being fulfilled late. The USSR Ministry of Heavy and Transport Machine Building, the USSR Ministry of Industrial Construction and the USSR Ministry of Power Machine Building are failing their quotas for construction of facilities for coal industry in the country's eastern regions. The USSR Ministry of Heavy and Transport Machine Building is not meeting its quotas for delivering high power quarry excavators to the USSR Ministry of Coal Industry, while the USSR Ministry of Automotive Industry is not meeting its quotas for delivering large capacity dump trucks.

Plans call for increasing the volume of stripping operations by 7 percent by the end of 1984 in order to insure fulfillment of the quotas for development of open pit mining. The increase in mining by rotary excavators will be 8 million tons, and the proportion of such mining will increase to 46.5 percent.

The Energy Program, which extends to the year 2000, foresees a further increase in open pit coal mining as one of the principal directions of the sector's technical progress.

Flow line and cyclic-flow line coal mining procedures using powerful rotary and chain excavators and complexes with productivities of 1,250-5,250 m<sup>3</sup>/hr will enjoy intensive development. A significant increase in the proportion of coal mining using such procedures is foreseen.



Open pit coal mining will increase in Krasnoyarsk Kray, in the Ekibastuz Basin, in East Siberia and in the Kuznetsk Basin.

Further acceleration of the development of open pit coal mining will require a greater effort to increase the volume of stripping operations. Growth in the volume of stripping operations will be insured primarily by the use of the most labor-intensive forms of transportation--rail and motor vehicle, the proportion of which will remain at about 70 percent of the total volume.

Further enlargement of the volume of extraction and stripping operations at open pits may be achieved only by supplying enterprises presently under construction and those undergoing reconstruction with production and auxiliary equipment characterized by high unit output, by introducing progressive production systems, and by achieving high labor productivity indicators on this basis.

Models of such equipment have already been designed in our country. However, the manufacturing plants are assimilating series production of the new equipment too slowly, persisting in the production of old models of machinery for which the assembly lines had been organized long ago. We need to take the necessary steps to review the assortment of equipment being produced by machine building plants with an eye on increasing production of highly productive machinery. We need to accelerate design of the following equipment and increase its deliveries to open pits: quarry excavators with bucket capacities of 15 and 20 m<sup>3</sup>, excavator-draglines with bucket capacities of 40, 65 and 100 m<sup>3</sup> and boom lengths of 85-125 m, rotary excavators and complexes with productivities of 2,500, 5,250 and 12,500 m<sup>3</sup>/hr, equipment for cyclic-flow line processes, including semipermanent crushing-sorting complexes with a productivity of up to 4,000 m<sup>3</sup>/hr and movable crushing units, cutter-type drilling rigs for drilling wells with a diameter of up to 300 mm and a depth of up to 60 m, transportation resources, to include alternating and direct current prime movers with trailer weights of 240, 360 and 372 tons, high capacity dump cars, dump trucks and truck trains with loading capacities of 120, 180 and 220-280 tons, high power bulldozers, front loaders, and auxiliary machines and machine units to mechanize laborious manual operations.

A high rate of development of open pit coal mining and intensification of technical progress at open pits are decisive factors in raising the sector's labor productivity.

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## COAL

### ROBOT IMPLEMENTATION PROBLEMS INVESTIGATED

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 14 Sep 84 p 2

[Text] V. Zenkovskiy reported in his article "Invisible Robots," published on 29 April, that the robots developed by specialists of VNIPTuglemash [All-Union Scientific-Research and Project-Design Institute of Coal Machine Building] in Moscow did not get integrated into the Kopeyskiy Machine Building Plant imeni S. M. Kirov. No one either at the plant or in the institute has even attempted to understand the reasons for this problem. As a result, VNIPTuglemash reports stated that the manipulators were implemented, while VPO [All-Union Design Association] Soyuzuglemash stated that the robots are providing an impressive annual income.

Deputy Minister of the USSR Coal Industry V. Gerasimov reported to the editors that the newspaper article justly noted the shortcomings in organizing the implementation and operation of automatic manipulators at coal machine-building enterprises.

Soyuzuglemash checked its enterprises to determine how the new industrial robots were being used. They found that out of 82 robots, 68 were in working condition. The other 14 were idle. Of these 14, 12 were at the Kopeyskiy Machine-Building Plant and 2 were in the Karaganda Mining Equipment Association.

Eight of the Kopeyskiy Plant's robots were transferred to a professional-technical school for educational purposes. Six of these have already been installed and adjusted. Two will be used for training purposes.

In August, Soyuzuglemash conducted a conference in Donetsk with the chief engineers and chief specialists of enterprises and institutes. Problems of using available robot-equipment systems and plans for implementing them in 1984-1985 were discussed.

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## COAL

### SURFACE COAL MINES PROFITABLE IN KUZBASS

Moscow IZVESTIYA in Russian 5 Sep 84 p 2

[Article by Ye. Shemyakin, deputy chairman of the Siberian Department of the USSR AS, corresponding member of the USSR AS, and M. Kurlenya, deputy director of the Mining Institute of the Siberian Department of the USSR AS, doctor of technical sciences: "Coal From Deep Mines"]

[Text] The Novosergiyevskoye Coal Field in the Kuzbass was explored for underground mining. However, those wishing to begin industrial production changed their minds before long--the prospects turned out to be unattractive. Several small mines, with relatively modest technico-economic indicators, would have been needed. In addition, preliminary calculations showed that at least 40 percent of the coal would be unrecoverable. The situation was fundamentally changed when the field was transferred to Kemerovougol' Association for surface mining. With a much smaller capital investment and in a short period of time, we formed a large enterprise that has high labor productivity and one-fourth the unrecoverable coal losses previously thought. Because of this alone, an additional 10 million tons of coal were produced here.

The working seams of the Kuzbass, particularly of its central region, have a complicated geological structure. The conditions for surface mining are far from the best. Add to this the Siberian cold and snow storms and the uninhabitability of remote areas. But, the association's miners are successfully and persistently overcoming the difficulties caused by nature itself. They have boldly equipped themselves with the latest achievements of science and technology, showing creative initiative and inventiveness.

The basin's surface mines have, for the first time in domestic practice, used basically new technological solutions for production-scale excavating and drilling-and-blasting. During the initial development period, the optimum pit depth did not exceed 50-80 meters. Now, pits in certain sections have been deepened to 200 meters. Scientifically based methods were developed for the surface mining of coal deposits down to depths of 300-400 meters, and technico-economic feasibility calculations were made. All the advantages of this progressive method would be retained at these depths.

In recent years, geological exploration and exploration-production work have been done simultaneously during the design and detailed exploration phase. This businesslike cooperation of specialized organizations and mines has permitted a more precise study of the coal qualitative indicators and seam thickness and structure. In all, this has reduced the lead times for new enterprise construction. This has been clearly demonstrated at the Siberginskiy and Ol'zherasskiy surface mines.

When sections are mined in river flood plains, a significant part of the coal is usually left in barrier pillars. Now, it has been proposed that the main water drain channels be relocated outside the pit. As a result, reserves which had been considered "unpromising" can be included for mining. This year, production from the Poymennyy Section is to be increased to 1.2 million tons, equal to the average mine's output.

The collective of the Kemerovougol' Association is celebrating its 20th anniversary this year. In that short period, coal output here has increased from 18.7 million to 54.3 million tons. The high economic efficiency of these capital investments was convincingly proven. Labor productivity in the surface mines is twice as high as at the sector's best underground mines; surface mine coal production costs are one-half those of underground mines. Surface mine workers, while producing 35 percent of the basin's coal, account for over 50 percent of the total profits.

The advantages and necessity of accelerating surface mine production growth in the Kuzbass have now been proven beyond the shadow of a doubt. On this basis, and in accordance with the decisions of the 24th CPSU Congress, development of the Taldinskiy, Karakanskiy and Yerunakovskiy surface mines has begun. Forecasts show that coal production from surface mines at existing enterprises can be increased to 100-120 million tons per year.

The work entitled "Developing a Large Industrial and Socio-Economic Surface Mining Complex for Coal Production (Including Coking Coal) in the Kuzbass" has been justifiably nominated to the competition for the USSR State Prize. This work, written by a group of authors led by L. Reznikov, general director of the Kemerovougol' Association, has great practical significance and will produce great economic savings.

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## COAL

### HIGH-ASH EKIBASTUZ COAL CAUSES POWER-PLANT PROBLEMS

Moscow IZVESTIYA in Russian 4 Oct 84 p 2

[Article by V. Vdovchenko, chief, Solid Fuel Laboratory, Institute imeni F. E. Dzerzhinskiy; Yu. Grin'ko, IZVESTIYA special correspondent, and L. Turov, GUDOK special correspondent, Ekibastuz-Tselinograd: "Buried Treasure and Kilowatts"]

[Text] Winter is approaching. Judging from the long-range weather forecasts, the winter may bring more than a few surprises. The normal operation of all sectors of the national economy during the cold months depends, of course, to a large degree on the fuel-energy supply system. There are, however, a number of notable shortcomings in the system.

There is a small map on the table. Like rays, the lines project out from Ekibastuz to the large cities of the Urals and Siberia. These lines are the coal supply routes to large power plants. There are over 20 such plants--each one uses millions of tons of fuel per year.

People have long used superlatives to describe Ekibastuz. Everthing here is "the most." The coal seams are 100 meters or more thick. The bucket-wheel excavators in the pits are capable of mining and loading 5,000 tons of coal per hour, or 120,000 tons per day. Super-heavyweight trains weighing up to 30,000 tons and 3-4 km long are put together at the Ekibastuz Station. They are hauled by the most powerful electric locomotives. Several dozen such trains can be dispatched each day!

But here's the problem: the giant excavators working the country's thickest coal seams often produce 12,000-16,000 tons of coal per day, instead of 120,000 tons. The station often dispatches only half the number of coal trains specified in the plan. Why?

Let's leave that question unanswered for now. Let's look at the technology involved here.

It's unique. There are no storage areas here--the coal goes directly from the seams into the rail cars. A strict rhythm, calculated down to the

minute, is needed to maintain the fast pace of mining and shipping. Also needed are close contact between mine and railroad personnel and exceptional harmony in operations.

What you don't have, you don't have, however. The Tselinnaya Railroad might not supply a single rail car for several hours, and then suddenly bring a thousand. You can't return lost time, though, and bottlenecks then occur at the station and on the tracks.

It would be logical to assume that such an operation would cause delays in fuel shipments that in turn would cause loud protests from power generating plants. But that's not the case--there are no protests. In fact, the Tselinnaya Railroad management receives telegrams asking them to stop fuel shipments. There are hundreds of refusals!

This is a complete mystery! Could it be that the power stations have found a way to reduce fuel consumption per unit of output? In order to find out what was going on, the participants in the investigative trip traveled to the Troitskaya GRES [State Regional Electric Power Plant].

This is one of the best power plants in the USSR Minenergo [USSR Ministry of Power and Electrification] system. When we asked Director Yu. Gusikhin why coal shipments were being refused, he didn't answer right away.

"Let's go out into the plant," said Yuriy Petrovich, "you'll see for yourselves."

Yes, there was something to see there. The pulverizers supplying pulverized coal for the 500,000-kilowatt unit were overloaded, while the turbine-generator output was low. There was one reason for this: unusually low coal quality. The actual ash content was 58 percent. Each ton of fuel contained more than 50 percent rock.

The true nature of the fuel is sometimes disguised by the black color; the fuel only fulfills the weight requirement. GRES Chief Engineer V. Makhortov showed us several open rail cars which contained, among the lumps of coal, white boulders weighing up to 100 kg. Bill of lading No. 006299 showed that the coal came from the Severnyy Surface Mine of Ekibastuzgol' Association.

It's impossible to sort out the coal from the rock at the GRES. It all goes to the pulverizer. From there, the pulverized rock and coal pass through the burners into the combustion chamber. What produces the power? After all, the necessary electricity must be generated. Here they use "booster," as they call liquid fuel, to produce enough electricity. For example, the Yermakovskaya GRES burns over 100,000 tons of liquid fuel per year. Imagine the total at all thermal power plants!

There's no way to avoid losses of output. The pulverized rock, like emery, wears out the boilers, and giant stalactites form on the boiler walls. To prevent damage, the giant generating units were shut down tens of times last year in order to clean out the boilers. This caused losses of nearly 800 million kilowatt-hours of electricity. It would require over 300,000



tons of standard fuel to generate this amount of power--much more if Ekibastuz coal was used in the calculation. All of this coal remained in storage areas.

This is one of the reasons that above-norm coal stockpiles have accumulated at power plants!

The press recently reported that the seventh generating unit of the Ekibastuzskaya GRES had been started up. Like its predecessors, it has a rated output of 500,000 kilowatts. In reality, all seven units put out a total of 1.5-1.7 million kilowatts. Technical difficulties are one cause of this, but poor fuel quality also plays a big role. The enterprise was even designed to operate on low-grade coals.

One might wonder: how many billions of kilowatt-hours are lost each year at power plants supplied by Ekibastuz?

It would take a lot of energy to calculate the total...

Even before the accelerated development of the Ekibastuz Field was begun, it seemed obvious that the coals would need enrichment, since their ash content was so high (up to 30 percent). Special research showed that this process would be very efficient. The optimum number of enrichment plants was determined.

Later it was decided to build 4 GRES's, with a total output of 16 million kilowatts, at Ekibastuz: the low-grade coal would be burned at the minesite and the electricity transmitted to the Center. Minugleprom [Ministry of the Coal Industry] figured: if the fuel can be burned at the site in special boilers, why enrich it? It's a labor-intensive process and the enrichment plants will hold up mining operations. Little by little, the opinion was formed that enrichment was unfeasible.

Years passed until GRES-1 appeared, and construction there is still not complete. The miners worked out several rich seams and began working poorer seams. The ash content rose steadily. The norm also increased, until it reached 43 percent.

This norm by itself is monstrously high--and it's only the average! There are beds where the rock content of the coal reaches 60 percent. At that level of "quality," the turbines at the power plants may stop working.

Well, they haven't stopped completely yet. Like the Chekhov character Denis Grigor'yev, the miners aren't taking out all the screws. They're leaving some in. They studied ad nauseum all the GRES's using their coal and are sending the worst fuel to those plants that have the largest fuel-oil reserves and are closest to the mines. At a critical moment, they can always throw in some additional coal to improve things. In other words, as an exception to the rule...

When the Ekibastuz surface mines were built, they were able to "save money" not only in enrichment, but also in weighing devices and carload

metering devices. Loading is done by "visual marks."

At the station, we requested that they weigh 10 cars from train No 3505. All the cars were overloaded, anywhere from 5 to 14 tons. The statistics testify to this: last year, 12,621 cases of overloading were recorded; since the beginning of this year, 13,500 were recorded. Less than one percent of the cars were even weighed. In addition, no one removed the excess coal. This also helps to create above-norm fuel stockpiles at power plants.

However, that's enough facts. You can't turn over every stone. We will ask the question: Well, Minugleprom, MPS [Ministry of Transport], USSR Minenergo and other departments participating in Ekibastuz affairs, will you be satisfied with this mismanagement?

And why not? Let's take the miners, for instance. They are presently shipping millions of tons of rock under the guise of coal. Is beneficiation a problem for the department? It's an expensive, troublesome matter.

Or, take the railroads. By hauling rock to the power plants, they log tens of billions of ton-kilometers, that turn into millions of full-value rubles. They are earning money without any particular difficulties: they supply and remove rolling stock and schedule the trains. Why sacrifice all of that?

In other words, the interested parties are not interested in going against the current practice. That's because this practice, as paradoxical as it may seem, is profitable for them.

And the government is the loser.

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## COAL

### DRAGLINES FOR SIBERIAN, FAR EAST MINES DESCRIBED

Moscow PRAVDA in Russian 25 Aug 84 p 3

[Article by Academician A. Tselikov, twice Hero of Socialist Labor, General Director of NPO VNIImetmash [Scientific-Production Organization of All-Union Scientific-Research and Project-Design Institute of Metallurgical Machine-Building]: "Powerful Helpers"]

[Text] One of the main directions of scientific-technical progress in the coal industry is the rapid growth of surface mining. Large excavators form the basis for this method. The designers and machine-builders were presented with the task of developing new, more efficient machines to work the giant coal fields of Siberia and the Far East. These fields are linked to the development of new industrial regions and with the fulfillment of the Energy Program.

In my opinion, Uralmash and Novo-Kramatorskiy Machine Building Plant (NKMZ) production associations and USSR Mintyazhmash [USSR Ministry of Heavy and Transport Machine Building], along with organizations of the electrical equipment, coal and other sectors, have successfully met this challenge. They have developed a series of modern, large walking excavators with 10-, 15-, 20-, 25-, 40- and 100-cubic meter buckets. Among these unique machines is the ESh 100.100 excavator, one of the largest in the world. It is now operating at the Nazarovskiy Surface Mine of Krasnoyarskugol' Association.

Walking excavators, having capacities of 8-14 million cubic meters per year, are, in terms of design and manufacture, among the most complex equipment in heavy machine building. The development of these machines required great creative efforts on the part of scientists, engineers and production personnel. Another important factor was the implementation of many highly efficient inventions made by Soviet specialists.

In the east, walking excavators do all the excavating in surface coal mines where there is no "rehandle" of overburden; this volume exceeds 280 million cubic meters per year. They also prepare over 70 million tons of coal for mining. This method has reduced mining costs and has increased labor productivity by 2-3 times, compared with rehandle operations. Only large machines of this type could have opened the new large surface coal mines of the Kuzbass, Kansk-Achinsk and other basins.

New design solutions and the wide use of welded structures, high-strength materials and highly powered main mechanisms--and much more--ensured the high technical quality of the excavators, equal to the best world-wide achievements. In addition, the Uralmash and NKMZ excavators are basically different from foreign excavators. Their main units have a number of original, more innovative design solutions.

The new machines have high productivity when handling heavy rock. They operate reliably at low temperatures, down to 40 degrees below zero. This is very important, since they operate mainly in the harsh climates of Siberia and the Far East.

Despite the fact that the present walking excavators are more powerful than before, significant quantities of metal and electricity are saved during their manufacture and operation. For instance, Uralmash's ESh 20.90 walking excavator has 33 percent higher productivity, 20 percent lower metal content and 5.5 percent lower energy consumption than the ESh 15.90A excavator.

The total savings from using large walking excavators--or draglines, as they are also called--total over 300 million rubles.

Thus, the task of developing, manufacturing and widely implementing modern, high-productivity, large-capacity walking excavators was fulfilled. These excavators permit the use of the most innovative non-rehandle development systems for mining solid minerals, particularly in coal fields of the country's eastern regions.

The development and implementation of a full series of modern draglines--including the ESh 100.100, one of the largest excavators in the world--show that domestic machine building is on the leading edge in this area. A scientific-technical potential has been created, on the basis of which the further growth of excavator building and innovative surface mining technology is planned. This is a great contribution to the fulfillment of the USSR's Energy Program.

The participants who helped solve this important national-economic task have rightfully been nominated for the 1984 USSR State Prize.

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COAL

#### BRIEFS

**ALTAYSKIY COKE QUENCHER COMPLETED**--Altayskiy Kray--Last year, the first line of battery No. 3 was placed into service. The second stage of construction is currently being completed--installation of the coke quenching unit. The various sub-assemblies and lines are being tested. A collective of the Koksokhimmontazh trust is testing the first production lines under operational conditions, and loading them with cold coke. Operation of the coking cars is being thoroughly checked. They are raised to a height of 50 meters for unloading. The brigades of fitters V. Luban, A. Chekryzhkov, and V. Khomkin are carrying out these operations in a coordinated manner. The builders promised to complete all shake-down operations in July. The tests of the heat-using equipment are still ahead. Start-up of the new complex will bring the next "million" producer of the Altayskiy Koksokhimzavod to full design power. [Text] [Moscow STROITEL'NAYA GAZETA in Russian 1 Jul 84 p 1] 12304

**COKE BATTERY NEAR COMPLETION**--The Zaporozhstroy and Koksokhimteplomontazh trusts also have great experience in increasing the production of coke by-products. However, differing from their colleagues, who work for Ural'skiy Khrebet, the affairs of the Ukrainian builders and erectors are going along well. In the reconstruction of the sixth battery, whose capacity is 445,000 tons of coke a year, masonry work in the fifth zone is being completed. The construction partners seem more reliable. Therefore, the fire-proofers of V. Shilin's self-supporting section have worked well together. In a large degree, the selfless work of staffer N. Petrenko, holder of the order of the Red Banner of Labor, facilitated this. Nadezhda Afanas'evna [Petrenko] participated in the rebuilding of all the batteries that were destroyed by the fascists. To her credit are even two new "million" producers. And before she retires, she decided to help her comrades restore one more unit. Soon, the pre-firing assembly will begin here. [Excerpts] [Moscow STROITEL'NAYA GAZETA in Russian 1 Jul 84 p 1] 12304

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## ALTERNATE FUELS

### DEPUTY MINISTER DISCUSSES PLANS FOR GEOTHERMAL POWER

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 3 Oct 84 p 4

[Article by USSR Deputy Minister of Power and Electrification G. Shasharin:  
"Utilizing the Earth's Heat"]

[Text] "Heat locked in the earth and heated subterranean water are believed to be promising sources of energy. What is being done in our country to hasten their wide utilization?"

N. Zakharov, Yakutsk

USSR Deputy Minister of Power and Electrification G. Shasharin replies to this question at the request of our correspondent.

Utilization of geothermal waters and the earth's underground heat is not a new problem. But until recently there have been no technical concepts which would make it possible to utilize such a generous gift of nature on an industrial scale. But a certain amount of experience has now been accumulated, demonstrating not only the fundamental possibility but also the effectiveness of utilizing geothermal energy sources. An example of this can be found in the Pauzhetskaya Steam-Hydrothermal Power Plant on Kamchatka, built back in 1967. On today's scale its output capacity is relatively low--11 megawatts. It is profitable. And in terms of its technical-economic indicators it surpasses electric power plants of comparable output utilizing imported and, consequently, expensive fuel.

Construction of yet another but larger geothermal electric power plant has been started--the Mutnovskaya plant. Its planned energy output is 200 megawatts. The first generation, with an output capacity of 50 megawatts, is to go into operation in the next five-year plan. It must be said that this is only the beginning of development of geothermal power engineering on Kamchatka. According to geological and geothermal forecasts, in the foreseeable future we will be able to build several plants in this area with a total output capacity of up to 2,000 megawatts. But other zones that are volcanically active today--Sakhalin and the Kuril Islands--are also rich in industrial reserves of geothermal steam and steam-water mixtures. Geothermal power plants may also be erected here in the future.

Recently scientists and specialists have been interested in so-called zones of thermal anomalies. In them, water-saturated beds are heated to 150-200°C to a depth of 4-5 kilometers. Utilization of this energy source is extremely enticing. All the more so because the output capacity of plants which could be built in our country on the basis of such thermal zones is estimated at 150,000 megawatts. About half of this capacity is available in the European USSR, and especially in its south--the Northern Caucasus, the Crimea, Armenia and the Transcarpathians.

However, extraction of subterranean heat has been found to be a difficult problem. Scientists and engineers have encountered a number of highly complex technical problems, including ones associated with creating so-called underground circulation systems. Such systems must be supplied with two groups of wells. Water is pumped into one group--the injection wells. Passing through porous rock, this water collects heat from them. Then the water returns to the surface through the other group--the producing wells, where it gives up its heat to create steam. The latter is then fed to turbines and used to obtain electric power. Experimental and industrial power plants will be created in the future on the basis of just such underground circulating systems.

We are already building three experimental facilities--the Kayasulinskaya in Stavropol Kray, the Tarumovskaya in the Dagestan ASSR, and the Mukachevskaya in the Transcarpathians. These regions were selected in order to test the operation of different types of systems in differing geological conditions. Only after sufficient experimental data are accumulated at these small experimental facilities (with output capacities of up to 10 megawatts) will systems of larger scale capable of competing with traditional electric power plants replace them.

It would be pertinent to note that the Scientific Research Institute of Power Engineering imeni G. M. Krzhizhanovskiy (ENIN) has done a great deal to make the tests successful jointly with planning organizations of the USSR Ministry of Power and Electrification. The plans are ready, the necessary materials have been gathered together, and the equipment is available. The main thing that is holding things up now is the drilling of the wells, which is the job of organizations of the Ministry of Gas Industry. Two years ago this ministry organized a new production association, Soyuzburgeotermiya. It was assigned the functions of the principal organization for extraction and use of subterranean heat. This should accelerate the well drilling effort.

Although the first experimental geothermal installations employing subterranean circulating systems have not yet been built, efforts by scientists in this area are continuing. Research is being conducted on protecting the equipment and on different types of power production units. Recently the ENIN has been working on a new type of facility--a combined geothermal-fuel power plant. They will use fuel only at times of peak loads in the power production system. The natural gas methane, which is dissolved in geothermal water, can be used for this purpose. There are up to 7 cubic meters of methane per cubic meter of water in some deposits. The economic indicators of combined geothermal power plants are better than those of plants using "pure" geothermal energy.

## ALTERNATE FUELS

### PROGRESS IN DEVELOPING TIDAL ELECTRIC POWER PLANTS REPORTED

Moscow IZVESTIYA in Russian 1 Jul 84 p 1

[Article by A. Blokhnin: "Energy from Lunar Tides"]

[Text] A high-output electric power plant will switch on at times of lunar tides on the Kola Peninsula. Specialists have finished compiling materials which substantiate the need for such a plant.

A pioneer of Soviet tidal power engineering--the Kislogubskaya Experimental Tidal Electric Power Plant--appeared in the 1960s in one of the fjords of the Kola Peninsula. The power plant's concrete block was poured in a drydock and then towed to its place of work. The same scheme will be employed to erect the experimental industrial Kol'skaya Tidal Electric Power Plant, with the one difference that the volume of its block is about 5 times greater. The technical concept proposed by Soviet engineers--construction of tidal power plants out of floating components--earned the recognition of specialists throughout the world. This method makes it possible to avoid erection of expensive dikes at sea, which makes the work almost a third cheaper.

"The goal of the first stage of the USSR's Energy Program (to 1990) was to create the material-technical base for wide use of nontraditional sources of energy--solar, geothermal, wind and tidal," said the plan's author, Doctor of Technical Sciences L. Bernshteyn. "The Kol'skaya Tidal Electric Power Plant will become just that scientific-technical foundation which will provide for construction of large tidal power production systems. The Kol'skaya tidal station, which has an output of 38,000 kilowatts (a hundred times more than the Kislogubskaya plant) is essentially a single block; as with a house made from prefabricated panels, such blocks will be used in the future to "assemble" the Mezenskaya Tidal Electric Power Plant, the planned output capacity of which is 15.2 million kilowatts!"

The natural energy potential of tides on the shores of the USSR is equal to about a third of the world's total potential. And were we able to utilize it, "lunar" turbines could generate 350 billion kilowatt-hours of electric power each year for the country's national economy. The Achilles heel of tidal power plants is their pulsating operation. But as it was found out, this snortcoming is not at all insurmountable. The planners intend to build

the Kol'skaya tidal plant "in tandem" with the Iokangskaya River Hydroelectric Power Plant: During the hours of operation of the tidal power plant, the hydraulic power plant reduces its output, economizing on water, while during lulls in the work of the tidal plant the hydraulic power plant switches on at full power. Of course, this duet is directed electronically.

Joint operation of two facilities on the Kola Peninsula is a unique sort of model for the work of the Mezenskaya Tidal Electric Power Plant in the GES-GAES [hydroelectric power plant--pumped-storage electric power plant] system of the united power system of the country's European territory. Moreover unique hydraulic machine units with an impeller diameter of 10 meters, designed by specialists of the Leningrad Metallic Plant, will be field-tested at the Kol'skaya Tidal Electric Power Plant.

The colossal energy of tides makes it possible to use tidal power plants to adjust for peak consumption in large regions of the country. Specialists feel that when the high output of the Mezenskaya Tidal Electric Power Plant is combined with that from large hydroelectric power plants on the Yenisey and Ob, this could all become a basic "high-latitude energy bridge," capable of transmitting the needed quantity of electric power to industrial regions by power transmission wires, and insuring stable operation of large power production systems.

Our possibilities are not limited to the European part of the country. Jointly with colleagues from the Pacific Oceanological Institute and other organizations, engineers and scientists of the capital's All-Union Planning, Surveying and Scientific Research Institute imeni S. Ya. Zhuk are working on the complex problem of creating a tidal electric power plant in Penzhinskaya Gulf in the Far East that is even more powerful than the Mezenskaya Tidal Electric Power Plant.

11004

CSO: 1822/56

## ALTERNATE FUELS

### GEOTHERMAL WELLS DRILLED IN TRANSCARPATHIANS

Kiev PRAVDA UKRAINY in Russian 15 Aug 84 p 4

[Article by Correspondent A. Kuz'ma, Beregovskiy Rayon, Transcarpathian Oblast: "Searching for Heat of the Earth's Interior"]

[Text] Drilling of the first parametric well in Transcarpathian Oblast has been completed at a depth of a little over 4 kilometers. A unique geothermal electric power plant will be erected at this site.

The lion's share of the earth's electric power is known to be produced by thermal electric power plants which burn coal and gas. However, the times have compelled us to seek new storehouses of energy. It became known that the main reserves of heat in the earth's interior are concentrated in rock. This was accounted for in the planning of the Transcarpathian Geothermal Power Plant.

Before its construction begins, a second parametric well will be drilled. In simple terms, the technology of delivering the earth's heat to the surface is as follows: Water injected under high pressure from a river into one well comes in contact with hot beds situated at enormous depth, after which it returns by a second well in the form of a steam-water mixture, which then operates turbines of an electric power plant. The water would be used many times over in a closed cycle.

This method promises many advantages. It will provide a possibility for generating cheap electric power while excluding all pollution of the environment. A geothermal electric power plant can heat many dozen hectares of hothouses as well.

In the opinion of scientists of the Institute of Technical Thermophysics of the Ukrainian SSR Academy of Sciences, the reserves of heat concentrated in the vicinity of the Transcarpathian geothermal anomaly are capable of replacing 5 billion tons of standard fuel! We have already begun utilizing this energy. The Zakarpat'ye sports complex, which is heated by hot water from a well 1,100 meters deep, is operating successfully in the rayon center of Beregovo.

Extensive construction has begun in the outskirts of the town of Nizhniye Remety. It is precisely here, geophysicists have concluded, that heated rock



is closest to the earth's surface. This is why rigs of the 'Krasnii' Association's Dolinskaya Drilling Operations Administration are thrashing over this region.

A cable bearing a sensor at its end is lowered slowly to the bottom. Measurements are taken by workers of the Carpathian Geophysical Research Expedition. The most diverse information is fed from the earth's depths to an automatic logging station. Including information which the scientists predicted: At a depth of 4 kilometers, the rock temperature attains 200 degrees of heat.

11004

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## ALTERNATE FUELS

### VERSATILITY OF PEAT EMPHASIZED

Moscow EKONOMICHESKAYA GAZETA in Russian No 35, Aug 84 p 16

[Article by Belorussian SSR Academy of Sciences Academician I. Lishtvan, director, Peat Institute, Minsk: "What Peat Can Do"]

[Text] Not that long ago peat was used predominantly as fuel. But research by scientists, particularly at our institute, shows that it is a highly valuable raw material for chemical industry, machine building, medical industry and environmental protection.

It would be feasible to use peat, an organic substance of unique composition, more widely to obtain new products and materials.

Jointly with scientific institutions of other republics, in recent years our institute developed procedures for producing biologically active preparations out of peat--growth stimulants for plants, animals and microorganisms. These preparations have a significant influence upon the basic components of metabolism, they increase the effectiveness of nutrition, and they increase body resistance to unfavorable conditions. Carbohydrate and carbohydrate-protein additives promoting fuller assimilation of the basic ration, maintenance of the health of farm animals and economization of rough and concentrated feeds used to fatten young agricultural animals and poultry have been proposed.

Working together with the Institute of Wood Chemistry of the Latvian SSR Academy of Sciences and other organizations, our scientists developed the procedures and basic equipment for continuous hydrolysis of peat, and tested them in experimental industrial conditions. An experimental industrial shop producing nutrient molasses has now appeared in Latvia. From my point of view construction of peat hydrolysis plants will enjoy development in the 12th Five-Year Plan.

Scientists of the Peat Institute of the Belorussian SSR Academy of Sciences have come up with an original solution for producing plant growth stimulants by oxidation of peat in an ammonia medium. The desired effect is achieved by raising the yield of the green vegetation of agricultural plants and potatoes while simultaneously increasing their protein content. Such preparations are undergoing production testing in the Belorussian SSR Ministry of Agriculture.

Moreover such a stimulant raises the gallipot yield from tapped pines in wood chemical production.

Our inventory contains an effective preparation that hastens growth of green crops and vegetables while simultaneously raising their vitamin content when grown on artificial soil in closed systems. This method is being used successfully aboard vessels of the Murmansk Steamship Company.

Methods of separating natural high molecular compounds in peat such as ultrasonic treatment, ozonation and irradiation have already achieved practical application. Exploratory research in this area attests to new and greater possibilities for extracting organic components from crude peat.

Research on peat from the standpoint of chemical technology requires further development from my point of view. This is especially true in relation to irradiation of peat and its components with the objective of subsequently cultivating certain races of microorganisms, azotobacters for example. The preparation rizotorfin was developed on this basis. Belorussia is building a plant to produce this product. In my opinion the biotechnology of peat has a great future.

Just the RSFSR's explored deposits alone are capable of supporting production of 50,000-60,000 tons of peat wax required for lubricant compounds.

One of the most effective materials obtained from peat today is wax. The sphere of its application is rather wide. It is used to produce compositions employed in precision casting by the lost-wax process, antiadhesive compounds (coatings) used in the molding of articles of various purposes out of foam polyurethanes (such lubricants are presently imported), and cable grease. This product is irreplaceable in the manufacture of some kinds of plastics, polygraphic foil, consumer goods, cosmetic articles and medical preparations.

Manufacture of seats, arm rests, the front instrument panel, the steering wheel and other foam polyurethane parts for Zhiguli and Moskvich motor vehicles has now been organized in Moscow, Syzran and Izhevsk on the basis of domestically produced lubricants. The possibilities for introducing such lubricants into footwear and medical industry are being studied.

Presence of 3 percent physiologically active compounds--stearins--was determined in the chemical composition of peat wax. We have come up with methods for concentrating and isolating them in pure form. As a result new cosmetic materials have been created: Vechernyaya, Pushinka and Maskarad mascara, toilet soap, hand cleanser, Beresta shampoo, creams and other goods enjoying popular demand. Moreover physiologically active compounds from peat wax have been used in the acquisition of medical preparations for the treatment of serious skin ailments.

Promising products based on peat include alkaline peat reagents to stabilize drilling mud used in the drilling of oil and gas wells, diluting agents for cement slurry, special molding powders intended for general technical

purposes, new sorbents for removal of nonferrous metal ions and petroleum products from liquid wastes and for removing hydrogen sulfide from industrial gases, metal-carbon fibers and catalysts.

It has been established that nitrogen is fixed by humic acids contained in peat, significantly raising their optical density. This premise was the basis for obtaining an effective dye. Plans have been drawn up for an experimental industrial shop producing such a dye at the Miskovskoye Peat Enterprise of the Kostromatorf Association with a capacity of 460 tons per year. Replacement of other expensive dyes by such a humic dye will produce a significant savings. Research is being conducted on using a peat preparation to dye viscose, to tan leather and as a corrosion inhibitor.

Production of new products out of peat is 15-20 times more profitable than its use as fuel.

Our institute has determined the laws governing formation of hydrocarbon adsorbents and developed pore structure depending on the composition of the raw material and the conditions under which peat and its components are subjected to heat treatment. A possibility has been found for obtaining hydrocarbon adsorbents with prescribed physicochemical characteristics and pore structure parameters for different purposes in industry and environmental protection.

Concurrently the basic production procedures have been created and the initial data for planning an experimental installation to obtain clarifying activated charcoal from peat have been compiled. Jointly with the Belorussian Design and Technological Institute of Urban Management of the Belorussian SSR Ministry of Housing and Communal Construction we tested experimental lots of peat charcoal for final treatment of drinking water in Polotsk and Minsk. Its higher effectiveness (by 15-30 percent) than industrial brands of coal was confirmed.

I would like to turn the attention of planning organs to the fact that our country possesses significant scientific developments in the theory and technology of producing activated charcoal from peat, and large raw material reserves for this purpose. Industrial production of peat adsorbents would best be started soon, in the 12th Five-Year Plan. This is an extremely promising venture. In the Netherlands for example, where there is only one peat deposit, the Norit firm is producing 18 brands of activated charcoal, and it is responsible for 80 percent of the world production of activated charcoal.

Recently the Belorussian SSR Academy of Sciences and the Belorussian Ministry of Fuel Industry developed the technical and economic grounds for organizing a low-waste peat processing installation in the republic to acquire new products on the basis of biochemical and thermochemical synthesis. Analysis of these technical and economic grounds would show that organizing production of new products out of peat using low-waste processes is 15-20 times more profitable than using peat as fuel. These ideas would be implemented in the 12th Five-Year Plan.

## ALTERNATE FUELS

UDC 553.541(47+57)

### OIL-SHALE EXPLORATION EXPANSION URGED

Moscow UGOL' in Russian No 10, Oct 84 pp 10-11

[Article by Engineers M. V. Golitsyn and L. M. Prokof'yeva (VIEMS [All-Union Scientific-Research Institute for the Economics of Mineral Raw Materials and Geological Exploration]: "Basic Ways for Expanding the Raw-Materials Base of the USSR's Shale Industry")]

[Text] World consumption of energy resources is increasing each year. In 1980 it was 11 billion t u.t. [tons of standard fuel equivalent] and, by the year 2000, it will grow to 18-24 billion t u.t.[1]. This will require the involvement of new sources of energy, one of which is oil shale, in the fuel and power balance.

Abroad, oil shale is used mainly for obtaining shale resin (synthetic oil). Industrial shale-refining installations are being erected in the USA, Australia, Brazil and Morocco. However, a highly developed shale industry exists at present only in the USSR and the People's Republic of China.

About 100 shale fields and shale shows are known in the USSR. These are concentrated mainly in the country's European portion. Total shale reserves are assessed at 193 billion tons [2].

The main routes for increasing oil-shale resources are as follows: exploration of new areas, the reexamination and reevaluation of known fields, a review of the specifications by way of moderating them, reduction of losses during mining and handling, and the application of new, progressive methods for using shale.

Characteristics of new oil-shale areas that hold promise for study and exploration [3] are shown in the table.

An important area for increasing resources is the reexamination and reevaluation of known and previously studied sections and fields. This refers especially to the Baltic basin, which the shale industry has developed, and also to regions that are experiencing a fuel shortage.

Thus, in the Estonian field, additional geological exploration must be performed at underground fields 61-62 and the northern part of underground-mine floor 11, and an economic and geological analysis of the prospects of underground mine floors 33-38 and 53-56, which are suitable for open-pit excavation,



Логеби, месторождения (1)	(2) Абсолютная глубина залегания		Качество сланца (5)				Запасы, млн. т (7)		
	число (3)	мощность, (4) м	$Q_s^d$ , МДж/кг (6)	$T_{sk}^d$ , %	$S_f^d$ , %	$A+B+C_1$	$C_2$	заблани- стые (8)	пробир- ные проб (9)
(10) Прибалтийский									
(11) Эстонское (участки Востоний, Центральный, Западный, шахт- ное поле 61—62, Северная часть шахтного поля 11, шахтное поле 14, резерв шахтного поля 13, кожная часть шахтного поля 12, шахтные поля 33—38, 53—56)	1	1,6—2,5	6,7—10,1	15—18	1,1—1,3	624	1504	698	
(12) Таласское	1	1,6—2,3	7,5—8,4	12—19	0,5—2		4330		62 000
(13) Месторождение диктеномевых сланцев	1	2—5	5,0—5,5	4	1,5—3,0				
(14) Ленинградское (участок Восточ- ный, Понсковая площадь)	1	1,8—2,1	11,6—12,5	4—32	1—3	340		661	
(15) Чудово-Бабинское	1	1,6	11,6—12,5	17—20	1—2			640	
(16) Припятский	1	1,2	5,0—7,9	10	2		901		
(17) Любанское	1	1,1—2,8	4,2—8,6	8	2,7		2680		
(18) Туровское	4	1,6—3,2	8,4—12,6	10—20	0,9—2,5				3 743
(19) Болтышское									
(20) Тимано-Печорский	1—2	0,5—0,9	6,3—8,4	8—10	2—5				3 338
(21) Ижемский район (Нерицкий и Ижма-Кедвинский участки, Ай- кванское месторождение)									
(22) Вичегодский	2	0,5—3,2	5,5—10,1	8—12	2—4				17 109
(23) Сысольский район	2	0,9—1,0	5,5—12,6	3—20	1—2,5				9 300
(24) Яренский район									
(25) Волжский	3	0,9—2,0	5,5—13,4	4—18	2—5	376	457		
(26) Общесыртовское	4	0,7—3,3	7,5—16,8	8—25	2—8		12 000		
(27) Перелюб-Благодатовская пло- щадь (участки Перелюб-Благо- датовский, Коцебинский, Запад- ный)	2—4	0,7—2,5	5,5—15,1	7—20	2—7		4602		
(28) Чаганское (участки Рубежин- ский, Центральный, Таловой, Восточно-Чаганский)	1	0,9—1,2	8,4—12,6	13	4—5		1 960		
(29) Кашпир-Хвалынская площадь	Око- ло 20	0,5—8,8	7,1—18,9	12—18	0,1—1,8	20	155	533	4 000
(30) Кендерлыкское									
(31) Байсунское	1	0,5—1,0	4,2—14,7	10—14	4—5			7	47 050
(32) Имударьинский, Кызылжумский									

Key on next page.

[Key to table on preceding page]

1. Basin and field.
  2. Characteristics of operating seams.
  3. Number.
  4. Thickness, meters.
  5. Quality of the shale.
  6.  $Q_s^d$ , MJ/kg.
  7. Reserves, millions of tons.
  8. Unproved reserves.
  9. Forecast reserves of groups I and II.
  10. Baltic.
  11. Estonian (Eastern, Central and Western sections, underground-mine floor 61-62, northern part of underground-mine floor 11, underground-mine floor 14, reserve of underground mine floor 13, southern part of underground-mine floor 12, and underground-mine floors 33-38 and 53-56.
  12. Tapa.
  13. Dictyonema shales.
  14. Leningrad (Eastern section and the prospecting area).
  15. Chudovo-Babinskoye.
  16. Pripyat.
  17. Lyuban.
  18. Turov.
  19. Boltyshskoye.
  20. Timan-Pechora.
  21. Izhemskiy Rayon (Neritskiy and Izhma-Kedvinskiy sections and the Ayyuvinskoye field).
  22. Vychegodskiy.
  23. Sysolskiy Rayon.
  24. Yarengskiy Rayon.
  25. Volga.
  26. Obshchesyrtovskeye.
  27. Perelyub-Blagodatovka area (Perelyub-Blagodatovka, Kotsebinskiy and Western sections).
  28. Chagan (Rubezhinskiy, Central, Talovoy and Eastern Chagan sections).
  29. Kashpir-Khvalynskaya area.
  30. Kenderlykskoye.
  31. Baysun.
  32. Amu-Darya and Kyzyl Kum.
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must be accomplished. At the Leningrad field, prospects should be reassessed at the "prospecting area," which has reserves of 654 million tons, and exploration should be conducted to the east of the portion already explored, and the field as a whole should be evaluated. The prospects of the Chudovo-Babinskoye field, which has reserves of 640 million tons (in the Baltic basin), must be assessed in the near future. The oil shale here is close in quality indicators to shale of the Leningrad field. One can expect a substantial increase in reserves, since the field as a whole has not been delineated.

Geological exploration should be resumed at the Kenderlyk coal-and-shale field. The shale layers, especially of the Karaungursk suite, which contains up to 10 formations from 1 to 15 meters thick, should be sampled. Available

information about the presence of shale there and its quality are rather contradictory, and final conclusions cannot be drawn on the basis of it.

If determination of the potential for integrated, wastefree processing of shale of the Boltyskoye field in the Ukraine yields positive results, detailed exploration will be required.

A relaxation of the specifications for thickness of shale formations and heat of combustion can produce a definite benefit. The first steps in this direction have already been taken. Thus, in accordance with the results of a preliminary exploration of the eastern section in the southern part of the Estonian field in 1980, temporary specifications were approved under which the minimum heat of combustion over a cross-section of the formation, taking into account 100-percent pollution with rocky intercalations within the formation, was adopted as 6.1 MJ/kg instead of the former 6.7 MJ/kg. Use of the new specifications for previously explored but unproved reserves in a portion of underground mine floor 14, the southern portion of underground-mine floor 12 and the reserve of underground-mine floor 13, enabled transfer to the proved reserves of 565 million tons.

An important reserve for preserving resources, especially high-quality shale in regions already developed, is a reduction in overall shale losses, among which operational losses are the greatest because of the excavation system being used. For example, shale is mined underground basically by the room system of development, a great deficiency of which is the great loss of shale in the pillars (30-40 percent). Because of this, proper attention should be paid to creating a technology for working the formation with small pillars or without any.

Simultaneously with improvement of the room-and-pillar system of excavation, mining with cutter-loaders, with full caving of the roof, has started at the Estonian shale field. Conversion to the slicing method system of development will enable underground shale losses to be cut about in half. Moreover, thanks to the "double slab" that is left in the underground mine, with the amount of mine mass produced left unchanged, the mine's shale-output capacity rises 1.2-fold to 1.3-fold [4].

Introduction of the technology for excavating shale with cutter-loaders and by the drilling-and-blasting method, with roof caving, at underground mines of the Leningrad field will cut losses 1.5-fold to 2-fold in comparison with the room-longwall system now being used.

The open-pit method for mining shale is more economical. Its prime production costs at strip mines is 1.5-fold to 2-fold lower than at underground mines. At present, because of the lack of preparation plants at strip mines, selective excavation with three approaches is used, and, in so doing, shale losses reach 20 percent, basically because of abandonment of the A+A' band. Where high-powered mobile equipment (bulldozer-ripper sets and wheeled loaders) is assimilated, A+A' bands, as well as G and H layers can be excavated.

An invariable prerequisite to introducing total shale excavation is the use of mechanical upgrading, since the output produced will not conform to the customers' requirements in terms of combustion heat and quality of the shale output.

Oil shale reserves can be increased not only by successful geological exploration, and the use of more effective mining methods, but also by the rational and economical use of the shale, with the application of progressive energy-operations schemes. For example, the introduction of a scheme that uses a solid heat-bearer will enable fuel consumption to be cut by 10 percent.

One of the basic tasks relative to Volga shales is the assimilation of methods for desulfurizing resins and other products that are obtained on the basis of gasification and semicoking of highly sulfurous shale. Light fractions of shale resins can be desulfurized by vapor-phase hydrogenation. Laboratory research has shown also the possibility of obtaining low-sulfur liquid products by catalytic pyrolysis of shales in the dust state, under low pressure of hydrogen. A method for thermal dissolution of shales is being developed that produces road-construction asphalt and low-sulfur liquid-fuel products.

The main body of oil shales of the known fields has a combustion heat that is not high (6.3-8.4 MJ/kg) and a shale-based resin output of 8-10 percent. Therefore, the development of methods for using low-sulfur shales is of paramount importance.

Oil shales are a multiple-content, complicated raw material. At the shale fields the use of both the organic and the mineral portion of the raw material, and also of byproducts and accompanying useful minerals and constituents (carbonates of rocks, gravel, peat and interbedded rock), becomes of special importance. Evidently it will be desirable to develop the Baltic diptychonic shale fields in unison with the phosphorites and glauconites that are bedded jointly with the shale.

The mineral portion of the Baltic shales can be used almost completely for producing viscous materials. The problem of using the mineral portion of Baltic basin shales with noncarbonate content must be solved.

Realization of the proposed recommendations will enable the status of the shale industry's raw materials base to be improved.

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11409

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## ALTERNATE FUELS

### BRIEFS

HELIOSTAT TESTED--Tashkent--An enormous glint of sunlight darted over gently sloping summits and the hairpin curves of the mountain road. Mirrors concentrated this glint into a single beam, which then shot through a thick sheet of aluminum. Such was the result of the first test run on heliostats of the unique Solntse scientific-production complex being erected in Tashkent Oblast, on spurs descending from Tien Shan, at an elevation of over 1,000 meters above sea level. There will be 62 such heliostats here. Each of them has an area of 50 square meters. They will transmit hot beams to the concave mirror of a concentrator, which is truly gigantic--2,000 square meters. And the glint that will shoot from it will effortlessly melt not only aluminum but also almost all materials known on the planet. A special melting furnace toward which the concentrator will direct hundreds of kilowatts of energy, will burn brighter than a thousand suns. The complex presently under construction is intended for acquisition of ultrahigh-heat and concurrently ultrahigh temperature materials needed by many industrial sectors. This is extremely difficult to do by traditional chemical methods and even by the most modern methods--ultrahigh frequency and cathode ray methods. This will also be the site of fundamental research on the use of solar energy, on high temperature physics and on semiconductors. [Text] [Moscow SEL'SKAYA ZHIZN' in Russian 16 Aug 84 p 1] 11004

SOLAR HEAT UTILIZED--Tashkent--Solar energy will make it possible to reduce fuel consumption to heat buildings by almost a quarter. The plan for such a town in the high-altitude Charvak recreation area was drawn up by specialists of the UzNIIPgradostroitel'stvo Institute. The exterior surfaces of the houses are simultaneously absorbers of solar energy; moreover the design itself of the solar energy receiving surface is significantly improved and more economical. The plan has now become one of the stages in implementing the republic's scientific-technical program for utilizing solar energy to supply heat to residential buildings. [Text] [By R. Tell'] [Moscow SPETSIALISTICHESKAYA INDUSTRIYA in Russian 2 Aug 84 p 2] 11004

CSO: 1827/56



## NUCLEAR POWER

### DELAYS IN CONSTRUCTION OF BALAKOVO AES REPORTED

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 18 Jul 84 p 4

[Article by N. Kozlov, brigade leader of Saratovgesstroy Administration, meritorious builder of RSFSR: "We Could Do Without Slow Workers"]

[Text] The dome of the reactor section will be installed at marker 62, which the builders of the Balakovo AES have reached. The giant crane is ready today to lift multiton structures, assembled on the ground, to this height. But the installers from the Gidromontazh [Hydraulic Equipment Installation] Trust state that the wind is interfering. However, let us not play the hypocrite. The schedule for introduction of work at the starting energy unit of the Balakovo AES was disrupted for a different reason. The dome of the reactor is the crowning achievement of multilabor and multivear phase of construction and should have been erected in June when the weather as a whole was more favorable. But operations in the collectives of two subdivisions Gidromontazh and Volgoenergomontazh [Volga Power Engineering Equipment Installation] were incomplete. They attempted to reproach the allied workers for slowness and in answer we hear the condescending reply:

"But don't rush us, there's no fire."

No, we will not "drive you." Because we understand our own responsibility for overall success and for fulfillment of the socialist pledges adopted by the collective of Saratovgesstroy. Their main item is to put the first energy unit into operation this year and to fulfill work worth 10 million rubles more than was planned. We strengthen our responsibility by specific actions. Despite universal breakdowns, the brigade entered "fulfillment" of 4,720 cubic meters of concrete in the schedule within 6 months, compared to the planned 4,000 meters.

I will not try to conceal the fact that we had to stay after the shift--after all, concrete is concrete and it will not wait for tomorrow or even for an extra hour. But we do not note this attitude among the installers.

For example, they turned over the cooling pond for concreting about 3 months late. They turned over the reactor shaft about 2 months late. The long-awaited 36th marker where the pressurized zone is completed was turned over about a month late.

The deputy chief of the Gidromontazh Trust O. Ivannikov and the deputy chief of the SoyuzenergoteploMontazh [probably All-Union Association for the Installation of Thermal and Power Engineering Equipment] A. Kovshov, who supervised the construction project, have a good knowledge of this. However, no effective measures to accelerate the work are visible on their part. The order of the USSR Minenergo [Ministry of Power and Electrification] on this account remains unfulfilled.

Why do I speak only about the reactor section? Because it is here that the greatest lag has been permitted. The other facilities cause no alarm.

And therefore as a whole Saratovgesstroy does not look bad for the results of 6 months. According to the general contract, 49.8 million rubles has been assimilated at the construction site of the AES--2 million rubles more than planned. In June, the administration passed the 9-millionth position for the first time during construction. However, work worth 10 million or more rubles must be completed monthly to guarantee success.

6521

CSO: 1822/15

## NUCLEAR POWER

### TURBOGENERATOR INSTALLATION AT IGNALINA AES

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 14 Jul 84 p 1

[Article by Yu. Stroganov, Snechkus, Lithuanian SSR: "A Giant Energy Unit"]

[Text] The second turbogenerator has been put into operation at the Ignalina AES. Construction of the first energy unit, the most powerful among the units at operating AES, has been completed at the same power plant.

We climb up steep and narrow ladders, just like shipboard ladders. And now we are on the platform where the housing of an enormous turbogenerator more than 60 meters long is being erected. A strong even hum resounds. The shaft of the unique unit 750,000 kilowatts in output makes thousands of revolutions per minute. Startup of the second assembly means completion of construction of the first unit with output of 1.5 million kilowatts. This is an outstanding event in the story of development of the firstborn of nuclear power engineering in Lithuania.

Let us inspect the complicated mechanisms. The brigade leader of installers A. Kozlovskiy approaches.

We ask him about the turbogenerator; Kozlovskiy laughs, says something, but it is inaudible because of the hum and then indicates in signs: the machine is operating excellently! And a little later the director of the Ignalina AES N. Lukonin also praises it. But although the turbine itself is complicated, it is only part of the gigantic artful mechanism that converts the nuclear power of the reactor to electric energy. Kilometers of pipelines and hundreds of devices are hidden under the platform.

The structures where everything is located are also complicated. It would seem that laying the bricks and pouring the concrete are complicated. But the laying and pouring must not only be done with high quality and precisely according to the design, but must be done very rapidly.

The first turbogenerator produced current 6 months ago and since then the atomic reactor with output of 1.5 million kilowatts, similar plants of which are not known in the world, gradually reached capacity under the observation of scientists. The day approached when the second unit was supposed to be switched on. The collective of the Western Construction Administration (ZUS) had to erect a room, called a box, for it.

however, let us return to installation matters. There are many rooms, ready for installation of equipment, and ready for turnover to operational maintenance in the reactor section and special vessel and in other facilities. But many compartments are empty. There are few people. The following situation vividly illustrates the shortage of work force: a little more than 9,000 people are working on the first shift at all facilities of the power plant, 1,500 are being hired for the second shift, and a little more than 300 are being hired for the third shift.

The organization of labor is also clearly limping along at the construction project. There is no other way to explain it than that many brigades do not yet have clear assignments for the shift, week or month. And a time study shows that idle times comprise up to 40 percent of work time even in the most outstanding collectives. These are very serious omissions on the record of the general contractor--[Administration for the Construction of the Sarator AES].

"Yes, we are also guilty of the lag," agrees the chief engineer of Saratovgesstroy A. Savkin. "But I say not to justify it, but from objectivity: we are erecting such a complicated facility for the first time. We probably overestimated our own capabilities and lowered the requirements on both ourselves and on our subcontractors."

The first meeting of the State Acceptance Commission was recently held at the construction site. Analyzing the situation, its chairman Ye. Ignatenko noted that the disruptions in the rates of installation work, for which Minenergo calculated, has not occurred. The builders are also lagging behind the directive deadlines.

There is still time to correct matters at the Balakovo AES. But to make up lost time and to put the first energy unit into operation this year, as was provided by the socialist pledges of the Russian Federation, the most vigorous and urgent measures are required. The startup deadlines have not yet been clearly defined. It is time to name a date.

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CSO: 18/2/15

## NUCLEAR POWER

### DELAYS IN STARTUP OF BALAKOVO AES CRITICIZED

Moscow SOVETSKAYA ROSSIYA in Russian 10 Aug 84 p 1

[Article by Yu. Burov, Saratov Oblast: "How Much Remained Prior to Startup?"]

[Text] A ruby-colored flag was raised several days ago on the "crown" of the reactor section of the first energy unit of the power plant. The brigades of hydraulic installers raised it 70 meters high together with the dome which crowns the sealed zone. The closer completion of the construction part of the facilities, the more important becomes matters among the installers, adjusters and operators. Preparation for functional tests of the systems and equipment was begun. The construction is entering a crucial pre-startup phase. But what is even more discernible: despite the fact that the plans are overfulfilled in monetary expression from month to month by most subdivisions, the lag behind the startup schedule is increasing. It comprises several months. Both the managers and workers no longer conceal their doubts about the reality of the designated startup deadlines. Why?

There are many reasons. There were delays and modifications in the design documentation, unsatisfactory supply of the construction project with metal, materials and equipment deficiencies in organization of labor and lack of organization among related workers. Our newspaper has often written about this and each time has received reassuring answers of this type:

"The measures adopted by Minenergo [Ministry of Power and Electrification] and by Soyuzatomenergostroy [not further identified] during the first 6 months made it possible to increase the collectives of builders and installers by 4,840 persons. The plan of the first 6 months in construction of the Balakovo AES was fulfilled by 105 percent."

"Minenergo continues the implementation of the planned measures on energy unit No 1. Systematic monitoring has been established over the course of construction." (Signed) deputy chief of Soyuzatomenergostroy Ye. Reshetnikov.

With regard to systematic monitoring, this is all correct. The minister, his deputies and managers of specialized departments have visited Balakovo several times. And each time vigorous measures seem to have been adopted in order to get on schedule: the tasks and deadlines were corrected, it was decided to accelerate the rates of deliveries and to strengthen the subdivisions with



experienced specialists and brigades, having sent them here from other power engineering facilities. However, the instructions of Minenergo were fulfilled torpidly and halfheartedly.

The hydroinstallers delayed the construction project and now the subdivisions of Soyuzenergomontazh and Soyuzelektromontazh [All-Union Associations for the Installations of Electric Power Equipment], have delayed it more than a year. Because of a shortage of low skills of people in such phase operations as installation of the cooling pond, the reactor and recharging shafts and the support ring, from 1.5 to 3 months have been lost. The installers themselves also created a time shortage. Moreover, it is the installation operations that determine the date of the beginning of startup-adjusting operations and introduction of the first energy unit. Will the lost time be made up?

"There is no doubt," assumes the chief engineer of the Gidroelektromontazh Administration [not further identified] V. Dontsov. "If you subtract things, we are only working one shift and we should be working a minimum of two. There are few workers."

Vadim Konstantinovich participated in erection and startup of several energy units operating on nuclear fuel and has sufficient experience to evaluate the situation. What does he then suggest? Clearer organization, additional efforts and utilization of the experience of erection of other AES. Take the problem of work force. Let us say, why do not the workers of Saratovenergo [probably Saratov Power Administration] operators come to the aid of the electric installers? These reserves are not yet being utilized, although there are some 130 specialists already in this electric shop of the board of directors of the AES. By participating in the installation, they would not only have considerably accelerated it, but would have consciously learned their own work stations and future facilities.

"Our electricians," the chief engineer of the board of directors T. Plokhii answered to this concept, "cannot help: they are preparing for operation."

This is not the first manifestation of a passive position which the board of directors occupies. For example, T. Plokhii feels that there are no problems whatever with turnover of the equipment to the installers. But there is a shortage of it worth 15 million rubles. And this is not the large-capacity equipment which has mainly been installed. Again a shortage of "small change" is strongly felt. One of these is the sealing rings for the transport hatch at the 36th marker of the reactor section. Conversations have been going on about them for approximately a month, the board of directors has several times given its word to issue them and there matters stand. There are many of these facts. But they do not very much concern the managers of the board of directors. Is this why the collective of operators is not ready for startup? There is now approximately a one-third shortage of maintenance personnel. In any case, one thing is obvious: instead of taking the initiative into their own hands and directing all efforts at the plant during the pre-startup period in a businesslike manner, the board of directors has taken the position of outside observer.

The most progressive methods were adopted for erection. Automatic concrete pumps that deliver the mixture to the heights through flexible hoses were used to lay the concrete. Because of using them at the construction site, more than 500,000 rubles were conserved. Instead of a traditional wood mold, a permanent reinforced concrete mold was employed. All this made it possible to construct the turbogenerator box successfully, within compressed deadlines. The collective of SMU-10 of ZUS distinguished itself. The brigades of I. Nikolayev and V. Korneyev and also workers from the motor transport and mechanization administrations, the administrations of industrial enterprises and other subdivisions of the construction project also labored excellently.

6521

CSO: 1822/15

## NUCLEAR POWER

### STARTUP OF SECOND ENERGY UNIT OF SMOLENSK NUCLEAR POWER PLANT

Moscow TRUD in Russian 9 Aug 84 p 1

[Article by G. Gromyko, TRUD correspondent: "In Starting Rhythm"]

[Text] The next phase in construction of the second energy unit of the Smolensk Nuclear Power Plant has been completed. The first half of the startup year is behind. What results has it brought to the collective of builders?

First and probably the most important achievement is the plant for construction and installation work has been fulfilled. Moreover, comparison of the volumes of work performed by quarters indicates a constant increase of the rates of construction of the energy unit. Whereas 40,338,000 rubles were assimilated during 6 months, the second quarter saw 22,401,000 rubles assimilated and June saw 8,160,000 rubles assimilated.

Incidentally, the increase of rates is noticeable not only according to the total figures. The builders constantly compare the most important operations and phases of work to the same cycles in construction of the first energy unit. And this comparison is in the favor of the present. For example, such a laborious and crucial operation as "rolling" the reactor into the shaft was completed 5 days faster. Installation of the separator was completed 2 days earlier. But these are not single examples, but a daily and mass phenomenon.

"If we are talking about the principal differences in the practice of construction of the second unit," relates the chief of construction B. M. Reva, "then the following indisputable fact is obvious: the most progressive advances are being employed here to a greater extent than in the first energy unit. You know what 'dry' joining is. TRUD talked about this new technique of assembly of wall structures. Introduction of the method made it possible to reduce the labor expenditures in the machine room alone by 8,000 man-hours. Installation of the canopy of the central room with reinforced structures, carried out by the collective of the Mosspetsatomenergmontazh Administration [possibly Specialized Administration for the Installation of Nuclear Power Equipment in Moscow] provided us with a time advantage of more than 1.5 months."

Or take a quite recent fact. Filling the reactor circuits in the first unit with serpentinite (this is a special mineral mixture that serves as biological shielding for the reactor) required more than 3 months. We could not

presently arrange such deadlines. Interest was raised in how this operation is coped with at other AES under construction. It turned out that the builders of the Chernobyl Nuclear Power Plant required only 10 days for this operation. The secret was that they mechanized the process of preparing the mixture to the maximum extent, while our technique was based mainly on manual labor. The brigade leader of installers I. Matveyev came to our plant from the Chernobyl AES to transfer his experience and demonstrated in practice how to adjust the technology.

The concrete mixer was adapted for this purpose. The brigade of V. Chernov produced 200 tons of serpentinite--one-sixth of the required amount--in only three shifts. And this is the result: we established the periods achieved by our 'teachers.'

Operations on the second unit are proceeding on a sliding schedule around the clock in three shifts. The prolonged rain considerably complicated the work of the builders, but they still maintain their high rates. Otherwise, it would be impossible to work now. Little time remained until startup of the energy unit but the work goes on. It is sufficient to say that 37 million rubles must be assimilated in 6 months in industrial construction.

The builders of the second unit have now begun a new phase of installation of the reactor--graphite stacking. Graphite serves as a neutron flux moderator. A good bit must be installed--1,700 tons.

The schedules of the main operations are calculated so that the last work--loading the fuel into the reactor--will be begun in December and startup operations will begin. All the collectives, participating in construction of the second unit, have joined actively in the competition to turn it over ahead of schedule. For example, the brigade of communist L. Kartashov achieved very high results--173 percent above the task--recently in installation of the precast concrete, reinforcement and assembled steel sections. Somewhat less is the result of the brigade of electric-arc welders of the Tsentroenergomontazh Administration [State All-Union Installation Trust of the Galvteploenergomontazh of the State Industrial Committee for Power Engineering and Electrification, USSR], the chief of which is V. Severin, 163.6 percent.

Fulfillment of the weekly schedules by 120-160 percent by the brigades is an ordinary phenomenon in construction of the second unit. But, unfortunately, not one subdivision as a whole has achieved this level of labor productivity. Lack of coordination between related workers and intrashift idle times are reflected in the rates of work as before. These losses sometimes "eat up" the time reserves which have been achieved through the efforts of the leading brigades. Under conditions when the construction project entered the stretch, as they say, even the slightest delay or interruption have serious consequences for the final result. That is why party and trade-union organizations and people's control organizations must intensify monitoring at the work sites during the decisive phase and that is why the competition for high quality of completing each shift assignment must be more widely organized. Every case of rejection and of idle time should become the subject of administrative and social inquiry and should not be left unpunished.

## NUCLEAR POWER

### PENZA PLANT MAKES NUCLEAR-POWER CONTROL DEVICES ON SCHEDULE

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 25 Sep 84 p 1

[Article by A. Zakharov, manager of the Industry Section of the newspaper PENZENSKAYA PRAVDA: "A Complex for AES's"]

[Text] The CPSU Central Committee Politburo recently reviewed the tasks for accelerated development of nuclear power. It was emphasized that success in its development is one of the root problems in further raising the economy's effectiveness. The Penza Elektromekhanika Production Association, which produces the sets of technical devices (KTS's) that will control the nuclear electric-power stations' power units, is making a definite contribution toward the solution of this important task.

The cabinets, modest in appearance, contain about 5,000 measurements' circuits. Like live tentacles, they grasp the heart of the reactor and, with the help of computers, decipher the signals that arrive, analyze them and, in case there is any discrepancy, issue the necessary commands to the actuating mechanisms. The power unit, in the guts of which, unseen by the eye, a controlled chain reaction rages, works without man's participation.

"A couple of days ago we managed to visit the Balakovskaya AES where, at the start of this year, we sent the first industrial batch of KTS's," says association general director V. Zhilinskiy. "The builders and installers are laboring here with fervor, and it is a matter of joy that the specialists' reports about our equipment are excellent."

Prior to last year, the collective produced Iskra electric calculators, which were two levels below today's equipment. It was required that production be reoriented--actually restructured--in the shortest time possible. It was necessary to replace equipment, work out construction-technology documentation applicable to local conditions, and retrain more than 200 workers and specialists...."

"We sent communists to the most difficult sections," says party committee secretary V. Ignatov. "The new business was entrusted to Schetmash plant chief engineer Yu. Knigavko, deputy department chief I. Dolgov, secretary of the department's party organization--equipment tuner A. Sironov, and others."



By the way, Aleksandr Aleksandrovich Mironov himself had to be retrained. He, better than anyone else, knew the existing problems and skillfully contributed to their solution. The people garnered knowledge at kindred enterprises at Tbilisi and Severodonetsk and took study courses that were established at the association. Production was restructured under the constant monitoring of a party-committee commission, which mechanical engineer V. Bubnov headed.

The association worked out a system for the simultaneous preparation of constructional design and industrial-operations documentation. Designers under G. Vostrikov, mechanical engineers under V. Kul'kov, and other sections quickly eliminated discrepancies, introduced useful innovations and tried to issue documentation in full, ahead of the established deadlines. This enabled the time spent mastering the production of new items to be cut by about a third. A formula for acceleration was adopted for equipping by the department that V. Shabunya headed. M. Volynskiy's Komсомol youth brigade of installers, V. Bannikov's assemblers' brigade, equipment tuners S. Rogov, V. Shigotarov and I. Veprov, and others did everything possible to carry out successfully the main item of the socialist commitments--to manufacture KTS's ahead of schedule for nuclear electric-power stations that are scheduled for early startup.

The association performed with honor the job assigned it. The shakedown production run of technical devices was manufactured at the end of last year, and, at the start of this year, the first industrial batch was manufactured half a month ahead of schedule for the Balakovskaya AES.

The association also coped successfully with an additional order, manufacturing equipment for the Zaporozhskaya AES's first power unit. And technical devices for power unit No 2 are being readied for shipment there. And next is the outfitting of the Rovenskaya Nuclear Electric-Power Station.

The M-64 control complex can also be used at hydroelectric and thermal electric-power stations, and that is why, at the end of July, the shipment of equipment for the Surgutskaya GRES started, and active preparations are under way for carrying out the order for the Berezovskaya GRES.

There is no doubt that all orders will be executed on time. The system of responsibility introduced into the association will help in this: definite brigades and specialists, who are dedicated to final results, have been assigned to the components and units here.

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## NUCLEAR POWER

### CONSTRUCTION OF AZERBAIJAN'S NUCLEAR POWER STATION STARTS

Baku VYSHKA in Russian 20 Sep 84 p 1

[Article by A. Gamedov: "An AES Is Being Started"]

[Excerpts] The first cubic meters of soil have been removed for construction of the Azerbaydzhanskaya Nuclear Power Station.

A couple of days ago the chief of the construction and installing administration, I. Mukhtarov, made a first accounting to the trust: in August the first 250,000 rubles for construction of the AES had been assimilated.

Before the end of the year a large amount of construction and installing work is to be done, for which there is design and budget estimating documentation. These papers are being developed by the prime designer--Rostov's Atomteplo-elektroproyekt [Institute for the Design of Nuclear Heat and Electric-Power Installations]. Azgosproyekt [Azerbaijan State Design Institute] is working as its subcontractor.

The pioneering base includes: road and rail access lines, facilities for supplying electricity and water, concrete and asphalt plants, a motor pool, warehouses, tanks and a reservoir....It is serving as the launch site, and the contractor, relying upon it, will promote construction of the main production base.

Thus has started the first step of the major, complicated preparatory period that precedes construction of the nuclear power station itself. During the construction, 77.6 million rubles will be assimilated. Aside from establishment of the pioneering base, these funds are aimed at construction of a temporary housing settlement, the primary housing, LEP's [power transmission lines], a rail access track, utility and service grids, the communications network, and so on.

In commenting on this important event--start of construction of the nuclear station's facilities--manager of the general-contracting trust Azenergostroy [Azerbaijan Trust for the Construction of Electric-Power Installations] Rasul Akhmedovich Gamidov said:

"At a recent session of the CPSU Central Committee Politburo the necessity for the anticipatory development of nuclear power was once again emphasized,

with a view to building up further the country's generation of electricity. The decree that the CPSU Central Committee and USSR Council of Ministers adopted for this purpose defined concrete amounts and deadlines for introducing into operation new capacity for power and a number of machinebuilding branches that make operating equipment for nuclear stations.

"The Azerbaydzhanskaya Nuclear Electric-Power Station is among these power giants. Its first power unit is planned for introduction in 1991.

"At first glance, the deadline is generous, but actually it is very rigorous. For we are talking not just about erecting the station itself. A whole city for 30,000-40,000 residents, with all the social, cultural and domestic-amenity facilities, is to be built, in order to provide for normal living conditions. The immensity of the construction that is being promoted is confirmed by this figure--13,300 people and thousands of pieces of machinery will be working at the numerous construction sites. We have never before had such a construction project in Azerbaijan."

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CSO: 1822/41

## NUCLEAR POWER

### CONTINUATION OF NERYUNGRINSKAYA GRES BUILDUP URGED

Moscow SOVETSKAYA ROSSIYA in Russian 11 Sep 84 p 1

[Article by V. Kamenev, chief of the Administration for Construction of the Neryungrinskaya GRES (Yakutsk ASSR): "'Surplus' Energy"]

[Excerpts] Next year we are to complete construction of the Neryungrinskaya GRES's first phase.

The station's first unit is already producing current and heat. We shall start up the second unit this year. The third, the following year. The GRES's whole first phase will thus go into operation. It would be natural to start work on the second phase right away. However, there is not even any talk about it yet. And an unexpected problem arises here for us: how to employ the collective of builders and installers--almost a multithousand collective, and how to deal with the production and social base that has been established here?

The evaluation of Energoset'proyekt [All-Union Survey, Design and Scientific-Research Institute for the Design of Power Systems and Electric-Power Grids] experts said that the Neryungrinskaya GRES's capacity can be limited to 570 MW. Further expansion of it, they say, is undesirable. In this case the specialists talk a lot about the Far East, refer superficially to Yakutia and say nothing at all about the BAM [Baykal-Amur Mainline] zone. Yet it is right here that large regional production complexes and industrial clusters will be built. They will need power. And so it is that our GRES's second phase will in no way be "surplus." It will have greater capacity and will cost less than the first phase, since the reservoir, the facilities for fuel delivery and chemical treatment of the water, and the distribution installations are already prepared. The only things that remain to be done are to build one smokestack, expand the main building and install three power units in it.

The specialists brought up misgivings that there may not be enough fuel for the station when it works at full load. But there are other resources besides the steam coal, which comes directly from the strip mine. The construction nearby of a preparation plant of the highest capacity for coking coal is being completed. After the coke concentrate is obtained, an intermediate product remains that is excellent fuel. Incidentally, it must not be stored for a long

time or transported over great distances. Don't put the valuable product into the ground! There will be more than enough of it for all the neighboring stations.

We are convinced that the collective can and must be preserved, with the future in mind. For this purpose it is necessary to assign the mission of creating a high-capacity power center, equipped with modern machinery, which would supply not only South Yakutia but also adjacent oblasts in the BAM zone. This will be not an agency or a local but a real nationwide approach to the matter. The problem requires solution. Today, people are seriously beginning to think about changing workplaces and they ply us with questions, answers to which are beyond our capabilities to provide.

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## NUCLEAR POWER

### BRIEFS

**ODESSA NUCLEAR-HEAT STATION--**Odessa Oblast--Engineering preparations for construction of the world's first large industrial-type nuclear heat-and-electric power central is being completed not far from Odessa. It will be established on the basis of two power units of 1-million kW each, with water-cooled water-moderated reactors. The many years of operation of the small Bilibinskaya AES at Chukotka, as well as the use of heat of the Beloyarskaya, Kurskaya, Smolenskaya, Novovoronezhskaya and other nuclear stations for heating power-worker settlements, have proved the progressiveness of this trend in the development of domestic power engineering. Less than a thousand gigacalories of heat per hour are required for the heating and other domestic needs of a small city with a population of 300,000. Boilerhouses would have to burn 400 tons of mazut for this purpose. The Odessa ATETs [nuclear TETs] will enable a thousand small boilerhouses to be dispensed with, the air basin to be upgraded, and an additional high capacity source of electricity to be used. [L. Kaybysheva] [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 7 Oct 84 p 2] 11409

**MULTIPLE-SOURCE POWER STATION--**(TASS)--Erection of the USSR's first power complex that will combine nuclear, hydraulic and pumped-storage electric-power stations continues on the Yuzhnyy Bug River in Nikolayev Oblast. Such a combination will enable electric-power reserves to be used more effectively throughout the day. The total capacity of the future power giant will be 6.2 million kW. Its main facility, the Yuzhno-Ukrainskaya AES, was included in the country's Unified Power System in December 1982, when a power unit of 1 million kW capacity gave its first power. The second power unit is due for startup this year. [Text] [Vilnius SOVETSKAYA LITVA in Russian 14 Sep 84 p 1] 11409

**BALAKOVSKAYA AES CONSTRUCTION PROGRESS--**Saratov Oblast--The red flag above the Balakovskaya Nuclear Electric-Power Station started to flutter in the resilient Volga breeze. It celebrates an important event that has occurred at the construction project: the 200-ton dome of the reactor was raised to an 80-meter height and placed precisely in its permanent position. The most complicated installing operation, preparations for which had long been under way on the ground, took about 1 hour. It is interesting that prior to this unique lifting, a specially built giant lifting crane, which has been named "Big Ivan" at the AES, raised in one operation a 330-ton reactor body, 340-ton steam generators....But nevertheless, the dome is a special component: it is the last among the "heavyweights" to be installed at the AES's first unit.

Soon the giant crane will move on its carriage to a new workplace--to the nuclear power station's second unit. The first 1-million kw unit should be turned over for operation by the end of this year. [M. Ovcharov] [Text] [Moscow IZVESTIYA in Russian 14 Jul 84 p 1] 11408

IGNALINSKAYA AES EQUIPMENT INSTALLATION--The installation of equipment for the second power unit has started at the Ignalinskaya Nuclear Electric-Power Station, which is being erected in Lithuania by decision of the 26th CPSU Congress. [Text] [Moscow EKONOMICHESKAYA GAZETA in Russian No 39, Sep 84 p 3] 11409

KALININSKAYA AES JOINS SYSTEM--Lithuania Joins--Still another nuclear power station has been joined to the country's power system--the Kalininskaya. Startup of the first power unit proceeded successfully, and, by the end of the year, the operators promise to "withstand the designed capacity--1 million kw. "And then the electric-power might of Soviet nuclear power stations will exceed 21 million kw," reported Deputy USSR Minister of Electric Power and Electrification G. Veretennikov. "This will enable about 42 million tons of fossil fuel to be saved per year." [N. Popinako] [Excerpts] [Moscow PRAVDA in Russian 1 Sep 84 p 1] 11409

ARMENIAN AES--(TASS)--The assemblies of the Armenian Nuclear Power Plant have generated 4 million kilowatt hours of electric energy since the day the first energy unit was started up. The meters of the AES recorded this figure 1 month ahead of schedule. This advance was possible as a result of clear interaction of all services and subdivisions of the station. [Text] [Moscow EKONOMICHESKAYA GAZETA in Russian No 33, Aug 84 p 3] 6521

SOCIALIST COOPERATION IN AES--Development of nuclear energy machine building is one of the fields of close mutually advantageous cooperation of the socialist countries. More than 50 plants and associations of Bulgaria, Hungary, the GDR, Poland, Rumania, the USSR, Czechoslovakia and also Yugoslavia are included in it. A photograph was taken in the shop of Machine Building Association Skoda imeni V. I. Lenin in the Czechoslovakian town of Plzen. Output of nuclear reactors and special fittings for AES was organized here within a comparatively short time with the technical assistance of the Soviet Union. [Text] [Moscow EKONOMICHESKAYA GAZETA in Russian No 33, Aug 84 p 22] 6521

NUCLEAR POWER GENERATORS--The Production Association Tallin Electrical Engineering Plant imeni M. I. Kalinin, operating as part of an economic experiment, has fulfilled by 100 percent the product sales plan with regard to deliveries according to contracts two quarters running. One of the main types of product of the association is continuous power supply units that provide nonemergency operation of generators for nuclear power plants. The Tallin assemblies, having the Badge of Quality, are now operating at many of the country's AES as well as abroad. [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 31 Jul 84 p 2] 6521

IGNALINA AES--The second turbine with output of 750,000 kilowatts of the Ignalina Nuclear Power Plant (Lithuanian SSR) has been connected to the Unified Energy System. The largest reactor with 1.5 million kilowatt-hour output has thus been started up. [Text] [Moscow EKONOMICHESKAYA GAZETA in Russian No 29, Jul 84 p 2] 6521

SHAMKHOR GES--The meters of the Shamkhor GES (Azerbaijan SSR) have recorded generation of the billionth kilowatt-hour of electric energy since startup of the plant. This position was achieved 1 month ahead of the planned deadline. [Text] [Moscow EKONOMICHESKAYA GAZETA in Russian No 29, Jul 84 p 2] 6521

CUBAN AES--(LenTASS)--Production of turbogenerators for the firstborn of Cuban nuclear power engineering--the Baragua AES--was begun at the Elektrosila Association. The Izhorskiy Zavod, Kharkov Turbine Plant and a number of other enterprises of the Soviet Union and socialist countries are participating in equipping this plant. The Leningrad electric machine builders are delivering two machines with output of 220,000 kilowatts each, which will differ considerably in design from the serial turbogenerators of this class, for the first unit of the AES of the Island of Freedom. Its main characteristic is much higher rotational speed of the rotor--3,600 rpms instead of the traditional 3,000. [Text] [Leningrad LENINGRADSKAYA PRAVDA in Russian 17 Jun 84 p 2] 6521

CSO: 1822/15

INSTALLATION OF ELECTROLYTIC PROTECTION EQUIPMENT, POWER LINES

Moscow STROITEL'STVO TRUBOPROVODOV in Russian No 7, Jul 84 pp 26-27

[Article by L. A. Subbotina, of NIPIorgneftegazstroy [Scientific and Research and Planning Institute of the Organization of Petroleum and Gas Construction Administration], under the rubric, "Advanced Experience"]

[Text] Combined protection of gas and oil pipelines is being employed in the industry with the aid of insulated coatings and electrolytic protection equipment [EKHZ] to reduce the number of breakdowns in the operation of pipeline mains and to reduce metal loss caused by soil corrosion and corrosion from stray currents.

Electrolytic protection of pipelines from soil corrosion is carried out by cathode and protective devices. Protection from stray current corrosion is obtained from direct contact, polarization and amplification devices, which protect through a current-drainage process. What's more, protection from stray currents is being implemented even in the construction process. Procedures for constructing and putting it into operation are implemented according to technology set forth in "Technical Specifications for a Technological System of Cathodic Protection from Stray Currents for Underground Oil and Gas Pipeline Mains During Their Construction" (RD 102-010--82 VNIIIST).

Cathode stations powered by alternating current from supply lines with rated power outputs of 1.2; 1.5; 2; 3 and 5 kilowatts, of the KSS, SKZT, SKST and ARTZ type, and a group of PSK and PASK-M transformer groups, and TDE-9 units are receiving the widest dissemination in cathodic protection units from pipeline mains. The last are intended for use in regions with cold climates and are placed in UKZV and UKZN self-contained units. Cathode stations with self-contained power sources (AES-TEG and ORMAT) are also being used.

AK-1, AK-3, EGT-1500, EGT-2000 and ECT-2500 models of steel, f-cresilicon, carbon-graphite and laminated graphite ground electrodes are being used for grounding in construction of anodic grounding devices. More and more often, pile-type and buried grounding is being used, especially in soil with high specific resistance.

Installation of USSZ, BDZ and BZK assemblies is called for to provide combined protection of underground distribution lines from corrosion and the elimination of harmful effects on protective devices on adjacent pipelines.

The average distance between cathode protective installations [UKZ] on pipelines amounts to 10-12 km, that is, 0.09 UKZ's per kilometer of pipeline. In planning electrolytic protection based on the long-range development of a multi-strand pipeline system along a single right-of-way, the interval between UKZ's is increased to 20-30 km. Cathode protection installations for successive lines are planned at intervals between already installed UKZ's and the lines of the first pipeline are connected to them. In their turn, successive lines are connected to UKZ's of the first lines. This increases the power of the UKZ's, since there are only 0.05 UKZ's per km of pipeline.

Power is supplied to UKZ's by specially designed 6-10 kw power transmission lines [LEP's] which run the length of the right-of-way and tap power from the local power supply network, and by operating LEP's from parallel pipelines. When laying several pipelines down a single right-of-way, the volume of operations needed to install LEP's for successive lines is reduced considerably, compared to the first line. For this reason, it is more economical to plan and construct multi-strand systems of pipeline mains along a single power corridor.

In connection with increasing demands for quality in pipeline installations, the manner in which their construction is organized is also being improved. So during construction of the Surgut-Polotsk pipeline, the NIPIorgneftegazstroy [Scientific Research and Planning Institute for the Organization and Construction of Oil and Gas Enterprises] proposed and implemented a system of control and accounting for the construction of electrolytic protection devices and LEP installations on the completed Yaroslavl-Andreapol section. During construction, operations on installing the anodic grounding devices, wiring up the low-voltage lines to the anodic grounding devices, installing the protective grounding devices and laying the draw-off cables at each UKZ were supervised.

Daily checks were made by the pipeline construction staff, and necessary information was sent to the central ministry staff. Knowing the real situation regarding EKhZ construction the pipeline staff expeditiously implemented the necessary measures to reinforce specific sectors of the operation, revealed shortcomings and the causes of lagging, promptly put questions to purchasers and at the same time achieved smooth operation in erecting the electrolytic protection devices and their power sources in accordance with the work schedule for the line flow. Construction of all electrolytic protection equipment and the power supply on this section were completed in full by the time the pipeline began to be filled with petroleum. When the Ukhta-Gryazovets and the Gryazovets-MOK gas pipeline systems were being built, construction of electrolytic protection equipment and power-taps from the 10-kw LEP's was also completed in the sectors of most trusts by the beginning of the gas pipeline tests.

During construction of the Urengoy-Pomary-Uzhgorod export gas pipeline, highest indicators were achieved in all construction areas, including construction of electrolytic protection equipment and LEP's.



Positive experience has been accumulated by the Welding and Installation Trust, and the Mosgazprovodstroy [Moscow Gas Pipeline Construction], Kuybyshevtruboprovodstroy [Kuybyshev Pipeline Construction], Komsomol'sktruboprovodstroy [Komsomol Pipeline Construction] and the Tatneftepromstroy [Tatar Petroleum Industrial Construction] Trusts, who completed work on electrolytic protection equipment in their areas promptly and even ahead of schedule. Before the beginning of construction, preparatory measures were carried out in these organizations, including familiarization with the planning documentation, development of production facilities for the operation, the formation of specialized brigades to construct electrolytic protection equipment and LEP power-taps and outfitting with necessary equipment, such as bulldozers, excavators, drilling rigs and truck-mounted cranes. Problems of integration and delivery of necessary materials and equipment to the project were also resolved promptly.

Construction of 10-kw power transmission lines along the length of the right-of-way and high-voltage power-taps on the export pipeline was done by USSR Minenergo Glavsel'elektroset'stroy [Main Administration for Construction of Rural Power Networks in the RSFSR] power installation organizations, and special-purpose formations of general contract organizations. Overall length of the 10-kw LEP for the export pipeline was 1,501 km. Individual Glavneftegaz-elektrospetsstroy [Main Administration of the Petroleum and Gas and Power, Special Construction] brigades achieved one km of completed LEP per day, (at an average, according to the central board, of 0.66 km/day). Eight out of 13 Glavneftegazelektrospetsstroy brigades worked by the contract brigade method. The greatest work rate was achieved on those sectors where the general contractor promptly allowed the work front where deadlines for placing structures, equipment, electric lines etc. were not delayed.

Examination of these problems at selective conferences, and constant supervision on the part of ministry management and construction staffs promoted improvement of the organization of construction on electrolytic protection equipment and power transmission lines.

The increasing speed of pipeline construction requires further improvement in the organization of EKhZ and LEP construction, which will insure their being switched into the operation prior to the time that the pipeline is put into operation. To do this, specialized general-contract subdivisions must be organized, having the permanently assigned equipment necessary to complete the entire range of operations for construction of EKhZ's and power-taps from 6-10-kw LEP's, and the responsibility of the general contractor must be increased regarding turning over electrolytic protection equipment and power transmission lines for a finished section of pipeline within the complex.

The start of basic operations must be preceded by a period of preparation, during which the builders are familiarized with the planning documentation and compare it with the full-scale conditions. At the same time the plan for the production of operations is being worked out, the necessary materials, tools, equipment and machinery must be assembled together and delivered to the site.

The preparatory period is an opportune time to agree with the planner and the purchaser on substitutions for materials, construction jobs and structures with which the construction project cannot be provided.

Construction work on EKhZ's and power-taps from 6-10-kw LEP's should begin at the same time as construction of the line segment of the pipeline, and special attention should be paid to the quality of completed work.

Minneftegazstroy [Ministry of Construction of Petroleum and Gas Industry Enterprises] must take measures to improve productive capacities for the delivery of ferroconcrete supports for 6-10-kw power transmission lines and AK-3 difficultly-soluble electrodes. We need to speed up production of an array of machines designed for year-round erection of 6-10-kw LEP's in Western Siberia, and other new equipment which will permit work rates and the quality of power-transmission line construction in the industry to be increased and improved.

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## PIPELINE CONSTRUCTION

UDC 621.047+622.647.7/003.1

### EFFECTIVENESS OF CONTAINER PIPELINE HYDROTRANSPORT EVALUATED

Moscow STROITEL'STVO TRUBOPROVODOV in Russian No 7. Jul 84 pp 13-14

[Article by N. I. Bogdan, M. M. Tikhonova and V. K. Lipskiy, of the Narpul'sk Polytechnical Institute imeni Lenin Komsomol of Belorussia]

[Text] To evaluate the effectiveness of new forms of transport, including container-pipeline hydrotransport [KTGT], a systemic analysis of the economic, organizational, social and ecological factors is needed.

The Institute for Integrated Transport Problems, attached to USSR Gosplan, has worked out the basic determinants for cost effectiveness for capital investments in the freight transport industry and the standards for cost indicators for extant forms of transport. However, the specific nature of KTGT, as a new form of transport, requires additional systematic indicators which take its special features into consideration.

The specific nature of a systematic approach to evaluating the cost effectiveness of a KTGT system comes to light when calculating base indicators for comparison, and also when calculating outlays reported from all interacting sections of the transport process, and outlays connected with the use of the above-mentioned form of transport.

Rail transport should be used as the base variant for evaluating the effectiveness of KTGT<sup>\*</sup>; however, comparison is also possible with other forms of transport (river, motor vehicle, pneumatic transport etc.).

During comparison, one needs to take into account the manner in which an industrial KTGT system is constructed, which can be done in one of two ways: by constructing a new pipeline which is designed to convey additional freight flows in containers, and by upgrading already-constructed pipelines which have passage capacity reserves.

\* A. V. Vlasov, A. P. Martynov, G. Sh. Kudoyarov: "Ekonomika, organizatsiya upravleniya i planirovaniya neftesnabzheniya" [The Economics and Organization of Administration and Planning for Petroleum Supply], Moscow, Nedra, 1975.

During calculation of the economic effect  $E_g$  of a newly constructed KTGT system, it is taken into account that the  $E_g$  base variant includes adduced outlays for existing modes of transporting the carrier fluid and freight.

The following is the formula for determining the annual  $E_g$ :

$$E_g = (Z_{nzhb} - Z_{nzh t}) A_{nzh t} + (Z_{ztg} - Z_{ktgt}) A_{ktgt}, \quad (1)$$

where  $Z_{nzhb}$  represents the proportion of adduced expenses for interchangeable transport of a carrier fluid, in rubles;  $Z_{nzh t}$  represents the proportion of adduced outlays for transport of a carrier fluid in a KTGT system, in rubles;  $Z_{ztg}$  represents the proportion of adduced outlays for interchangeable transport of freight, in rubles;  $Z_{ktgt}$  represents adduced outlays for transport of freight in a KTGT system, in rubles;  $A_{nzh t}$  and  $A_{ktgt}$  respectively represent the annual volume of carrier fluid and freight in containers transported, in tons.

When operating pipelines are upgraded, the base variant does not take outlays for carrier fluid into account, as it has already been assimilated by the transport flow. Then, the annual effect  $E_g$  will be expressed in the following form:

$$E_g = (Z_{zt} - Z_{ktgt}) A_{ktgt}, \quad (2)$$

where  $Z_{zt}$  and  $Z_{ktgt}$  respectively represent the proportion of adduced outlays for transfer of freight on an interchangeable transport mode, and in a KTGT system, in rubles.

When determining the cost effectiveness of changing a portion of the freight flow over from an existing mode of transport to a KTGT system, it is advisable to calculate the elements of adduced outlays only in that portion changed to alternative modes of transport, that is, according to the size of the portion of outlays and capital investments moved.

When determining the cost effectiveness of changing a portion of the freight flow over from an existing mode of transport to a KTGT system it is advisable to calculate the elements of adduced outlays only in that portion changed to alternative modes of transport, that is, according to the size of the portion of outlays and capital investments moved.

Provision of complete accounting of outlays and effect is the second methodic feature in an economic evaluation of the KTGT system. Regarding both outlays and effect, it is necessary to take all the interacting sections of the transportation process into account, including operations connected with packaging, storage and preparation of freight for use. The necessity of such an approach is dictated by the fact that outlays for the indicated operations differ significantly, depending on the mode of transport used, and they reach considerable size, and by the fact that on various modes of transport, there are costs included in the production cost of shipments which are not found at all levels of the transport process. For example, on rail transport, outlays for on- and off-loading and storage of freight are not included in the shipping production costs, then later, as in pipeline transport, they are considered part of the operating expenses, etc. Accounting of outlays and effect at all interacting stages of the transportation process and operations connected with them make possible a comparison of the comparable variants.

An accounting of the quality of the shipment is also obligatory. This can be evaluated by loss and damage indicators, which are included in the operating expenses, and the size of the turn-over facilities, which are part of the capital investments. An accounting of the quality of transport is the most important condition for comparing the variants when evaluating the effectiveness of transporting viscous petroleum products (bitumen, for example) in containers along a pipeline. The methods in use now of transporting liquid bitumens in tanks and solid bitumens in paper containers leads to freight losses. Using containers practically eliminates these losses.

Proceeding from the above, when calculating adduced outlays in order to evaluate the cost effectiveness of a KTGT system, the operating expenses for the complete shipping cycle  $S_{ek}$  must include the following elements:

$$S_{ek} = S_{pd} + S_p^{kh} + S_{md}^{pr} + S_{md}^t + S_{mt} + S_{mt}^{pr} + S_{mp}^{pr} + S_{mp}^t + S_p + S_{pp} + S_{kh}^{pot} \quad (3)$$

where  $S_{pd}$  and  $S_p$  represent outlays connected to preparation of the freight for transport and consumption;  $S_{md}^{pr}$  and  $S_{md}^t$  respectively, represent outlays for loading and unloading the product and its delivery to main-line forms of transport;  $S_{mt}$  represents outlays for freight transport via main-line modes of transport;  $S_{mt}^{pr}$  represents outlays for loading and unloading operations connected with main-line modes of transport and  $S_{mp}^{pr}$  and  $S_{mp}^t$  represent, respectively, outlays for the loading and unloading of the product and its delivery from the main-line modes of transport to the consumer;  $S_{pp}$  represents losses from damage and shipped freight losses;  $S_{kh}^p$  and  $S_{kh}^{pot}$  represent outlays connected with freight storage at the supplier and the consumer, respectively, depending on the mode of transport and the packaging method.

Capital investment for the complete shipping cycle  $K$  are determined according to the formula:

$$K = K_{pd} + K_{kh}^p + K_{md}^{pr} + K_{md}^t + K_{mt} + K_{mp}^{pr} + K_{mt}^{pr} + K_{mp}^t + K_p + K_{kh}^{pot} + M + M_{kh} \quad (4)$$

where  $K_{pd}$  and  $K_p$  represent capital investments at industrial enterprises connected respectively with preparation of the product for transport shipment, and for use at shipping points;  $K_{md}^{pr}$  and  $K_{md}^t$  represent capital investments, respectively loading and unloading and delivery of freight to main-line modes of transport;  $K_{mp}^{pr}$  and  $K_{mp}^t$  represent capital investments respectively for



loading and unloading and delivery of the product from main-line transport to the consumer;  $K_{mt}$  represents capital investments for freight transport via main-line transport (railroad rolling stock, and permanent facilities);  $K_{mt}^{pr}$  represents capital investments for completion of loading and unloading operations connected with main-line modes of transport;  $K_{kh}^p$  and  $K_{kh}^{pot}$  represent capital investments connected with freight storage at the supplier and the consumer, respectively;  $M$  represents the size of the turnaround facilities which are part of the delivery process (in-transit load mass);  $M_{kh}$  represents the size of the turnaround facilities, in production reserves, at the consumers.

The method which has been formulated was used to evaluate the effectiveness of converting an operating pipeline with a length of 516 km and a diameter of 530 mm to transport petroleum bitumens, at an annual volume of 170 thousand tons, in a stream of diesel fuel.

As the calculations, which were carried out according to the suggested method, have shown, the annual economic effect of redistributing the freight flow of petroleum bitumens from the railroads to the KTGT system has been provided by the reduced outlays connected with the packaging and storage of freight and its preparation for the consumer. This stems from the fact that the KTGT system insures uniformity of freight delivery, the convenience of its continued use and substantially reduces the consumer's outlays for storage and preparation for use. Thus, for example, the need for expensive bitumen storage facilities for preheating, and a series of operations to prepare the bitumen for use, such as steaming and crushing, are no longer needed.

The preparation of freight packaged in casings practically eliminates losses and increases production efficiency, and furthers environmental protection. Here, losses of the carrier fluid from containers is negligible (0.26 kopecks/ton of freight).

So the suggested method for economic evaluation of the KTGT system, according to the indicator of adduced outlays for freight, with a calculation for outlays for packaging the freight, its storage and preparation for use, permits, from the national economic standpoint, a determination of the economic effect by the redistribution of a portion of the freight flow from the traditional modes of transport over to the KTGT system.

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NOTE: Individual formulaic components are transliterated.

## PIPELINE CONSTRUCTION

### URENGOY-TSENTR-1 READY TO TRANSPORT SIBERIAN GAS

Moscow SOVETSKAYA ROSSIYA in Russian 3 Aug 84 p 1

[Article by A. Avdeyev: "Pipeline Begins Operation"]

[Excerpts] The Urengoy-Tsentr-1 pipeline is ready to transport Siberian gas six months ahead of schedule. Workers on the line had to traverse more than 900 kilometers of swamp and marshland, 113 kilometers of permafrost, many roads and railways and hundreds of rivers. Over 100 million cubic meters of earth including rock were excavated during construction.

I will cite still another statistic: in the past two and a half years the productivity of labor in the Ministry of Oil and Gas Construction has risen more than 21 percent and has reached the goal set for the end of the five year plan. This is due to the unyielding toil of the line brigades. Today 1,500 kilometers of the Urengoy-Tsentr-2 pipeline, the last of six pipelines planned for construction during the 11th five year plan, have been welded together. This pipeline is an exact duplicate of those lines already built, but the tempo of work here is even faster. Already some sections of the new pipeline have been successfully tested, and the user has taken delivery of a 98 kilometer section of the line.

A. Buyankin, Chief of Engineering of the trust Mosgazprovodstroy (Moscow Gas Pipeline Construction Trust) explained: "A unified system of job authorization has helped us to achieve such high productivity. One can not call this innovation in our industry, but we have gone further. For example, we have perfected a pay system geared to the finished product and have raised worker interest in the integrated carrying-out of operations. Thus, we have succeeded in reducing labor expenditures and bridging the gap between separate technological operations."

The construction of six huge gas pipelines and the development of the Urengoy field exceed in capital investment the cost of BAM, KamAZ, VAZ and Atomnash (Baikol-Amur rail line, Kama Automobile Plant, Volga Automobile Plant) collectively. On the one hand, such a comparison underscores the enormity of the project, but on the other hand, forces one to think about its cost.

Deputy minister Yu. Andreychev said: "A complex of scientific, technical and organizational measures are being taken in our industry in order to economize resources. Work is being accomplished successfully to improve design decisions, accounting and designing methods and to introduce economical materials and also substitute materials. The construction of cross country gas pipelines from the northern part of Tyumen Oblast to the center of the country along one "corridor" was a great achievement. We are now making the transition to an integrated standardization of energy outlays, which includes the use of all types of energy and fuel. However, real success will come only when every industry worker takes part in this conservation campaign."

To build quickly, well and economically is the motto of those who work on the pipelines. It is continually confirmed in their efforts. In a few months construction workers will report on a new labor triumph. The sixth pipeline will become operational ahead of schedule.

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## PIPELINE CONSTRUCTION

### PROGRESS REPORT ON GAS PIPELINE CONSTRUCTION FOR JUNE

Moscow EKONOMICHESKAYA GAZETA in Russian No 28, Jul 84 p 3

[Article by V. Voznyak: "Along the Gas Pipeline Routes in June"]

[Text] Last month was especially hectic. Tests had to be completed and certain sections of the Urengoy-Tsentr-1 gas pipeline put into operation, and also much work had to be completed on the construction of the Urengoy-Tsentr-2 line section and compressor stations.

Units of Glavsibtruboprovodstroy and Glavvostoktruboprovodstroy (Central Siberian Pipeline Construction Authority and Central Eastern Pipeline Construction Authority) worked well in June. Approximately 1,000 kilometers of pipeline were successfully tested, and even more (including that in process from May) were put into operation, all of which permitted Ministry of Gas Industry enterprises to increase the volume of natural gas deliveries to the economy.

In June only the work collectives of Glavtruboprovodstroy and Glavvostoktruboprovodstroy were able to work at full capacity on the construction of the Urengoy-Tsentr-2 gas pipeline. In Tyumen Oblast, where the Glavsibtruboprovodstroy trusts are engaged, work tempo was noticeably reduced due to natural and climatic conditions: swamps became impassable and operations were possible only on certain limited sections of the line.

Nevertheless, overall, in June workers on the project were successful in welding more than 260 kilometers of pipe into the line and in insulating and laying underground more than 200 kilometers. The daily rate of line construction reached 12 kilometers. The integrated engineering collectives of A. Serdyukov (Bryansktruboprovodstroy Trust) and V. Belyayeva (welding-assembly trust) distinguished themselves. The collective headed by A. Buyankin from Mosgazprovodstroy Trust completed construction in June of the pipeline section assigned to it.

As of July 1, 1,260 kilometers of the pipeline had been welded. About 900 of them had been insulated and laid. Construction of this gas transporting line is being completed ahead of schedule.

The route of the gas pipeline Urengoy-Tsentral cuts across 25 rivers, including large ones like the Ob, Volga and Kama. By the beginning of July, underwater trenches had already been constructed across 11 water obstacles, including the Pravaya Khetta in Tyumen Oblast, the Ob and the Don. In June, arrangements were completed for underwater trenches across the Kama and the Ob (a reserve line). The collectives of Soyuzpodvodtruboprovodstroy (All-Union Underwater Pipeline Construction Association) are doing their work ahead of schedule.

Many work collectives from construction ministries, Minmontazhspestroy (Ministry of Installation and Special Construction Work), USSR organizations, and a number of socialist countries which are participating in the pipeline construction have distinguished themselves during the completion phase of the construction of the Urengoy-Pomary-Uzhgorod compressor stations. Start-up adjustment organizations of the Ministry of Gas Industry and foremen-installers from equipment manufacturers have been putting in an active effort.

Units of Minneftegazstroy (Ministry of Construction of Petroleum and Gas Industry Enterprises) are leading in the construction of compressor stations Khasyreyskaya, Pelymskaya and Sechenovskaya, organizations of Minenergo, USSR (Ministry of Energy) at the construction of the Arysckaya Station, of Minstroy, GDR (Ministry of Construction) at the construction of Torleyevskaya Station, of Mintyazhstroy, USSR (Ministry of Construction of Heavy Industry Enterprises) at Kuzckaya Station, of Minpromstroy, Ukrainian SSR (Ministry of Industrial Construction) at stations Sofiyevskaya and Stavishchenskaya. Construction of the following compressor stations has been completed on time: Romenskaya (Polish workers), Golyatinskaya (GDR workers) and Ordynskaya (Yugoslav workers).

In June the construction of a series of primary stations of the Urengoy-Tsentral pipeline was completed. Workers of the Kazymgazpromstroy Trust (headed by V. Lysyuk) of Minneftegazstroy successfully managed with the assignment to put the compressor station Verkhnekazymskaya into operation, and workers of the trust Severgazstroy [Northern Gas Construction] (headed by B. Shpak) of the same ministry completed construction of station Priozernaya ahead of schedule. Workers of Minenergo, USSR worked well on the construction of Chaykovskaya Station and ensured its completion in July.

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## PIPELINE CONSTRUCTION

### INTERNATIONAL COMMITTEE SEEKS WAYS TO IMPROVE NATURAL GAS TRANSPORTATION

Yerevan KOMMUNIST in Russian 19 Jul 84 p 4

[Article: "Blue Lines of Friendship"]

[Text] In Yerevan a meeting took place of the Committee on the Transportation of Gas of the International Gas Union that unites 46 countries in which more than 95 percent of the world's gas is produced. The meeting was devoted to a current problem: the efficient and reliable delivery of gas to the consumer.

Representatives of socialist bloc countries, western European states and also Canada participated in the meeting. Hayk Dzhavadyan, First Deputy Chairman of the Republic of the Yerevan City Council of People's Deputies greeted the guests. He told the meeting participants about social changes that have taken place in Armenia during the years of Soviet power and he noted that in Yerevan, a city of one million, the task of supplying gas to residential buildings has been completely resolved.

Professor Yu. Korotayev, Deputy Chairman of the Scientific and Technical Society of the Oil and Gas Industry Central Directorate and winner of the USSR State Prize told the meeting about advanced scientific and technical solutions that are being brought into being in the Soviet Union in conjunction with the construction of cross-country gas pipelines and the transportation of gas.

Yu. Lebedev-Tsvetkov, a member of the Committee on the Transportation of Gas of the International Gas Union, chief engineer of Glavstroygazoprovod [Central Construction Authority for Gas Pipelines] of the Ministry of Gas Industry gave a talk "On the Construction of the Cross-Country Gas Pipeline Urengoi-Pomary-Uzhgorod" and he noted that this trans-continental gas pipeline, the construction of which has captured the interest of the entire world, was built and put into operation in record time and is a worthy contribution to the realization of the decisions of the 26th Congress of the CPSU.

Problems of scientific and technical cooperation were discussed and talks were given which will be presented to the next scheduled international gas conference in Moscow in 1985.

After the meeting KOMMUNIST counterpart S. Vlasov met with G. Tataryan, General Director of the production association Yerevanmaz (Armenian Gas Transportation Authority) and he asked him to share his impressions:

"This is the first time that a meeting of the Committee on the Transportation of Gas has taken place in Armenia. In connection with the sharp increase in the production of gas, the most efficient fuel on our planet and a raw material for the chemical industry, the question has arisen about its efficient transportation and this question has captured men of wide interests.

"The problem of transporting the gas is an acute one. Consumers are located at great distances from the sources of production. The route of these steel gas pipelines cut across state boundaries. The USSR is one of the few countries in the world which guarantees the safe and delivery of gas to many countries.

Our country is a leader in the use of large diameter and high pressure pipes. Gas workers in Armenia, which has 90% of its gas from Bulgaria and Finland together, are pioneers in the construction and use of gas pipelines in mountainous conditions. In the republic these steel cross country gas pipelines traverse areas at elevations of up to 6,000 m above sea level. Despite these difficult conditions, more than 90 percent of the residential construction and the industrial enterprises are provided with gas. After gaining the experience in constructing gas lines in the mountains, we constructed three more major steel cross country lines on the transcontinental gas pipelines Tbilisi-Uzghorod, Orenburg-Uzghorod and Urenskiy-Uzghorod along 1425 km of steel pipes. The transportation of gas into Armenia is a difficult problem. The question of the climate of cooperation of many countries will be raised in its solution and in the establishment of contacts."

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## PIPELINE CONSTRUCTION

### GDR SPECIALISTS LAY 300-KM PIPELINE SECTION

Moscow IZVESTIYA in Russian 21 Jan 84 p. 1

[Article by Ye. Valov: "Friends Lay the Right-of-Way"]

[Text] Tula Oblast--The laying of the hundredth kilometer of pipe of the Yele s-Serpukhov gas pipeline has been completed. The line runs through parts of Lipetsk and Tula oblasts where the narrow but tempestuous Kravaya Mecha flows. The route of the line twice crossed its banks. Now, near the village of Teploye a third crossing is about to take place. The river was blocked off by a dam and it submissively came to a stop. It now stands dead still seemingly pondering over what is going to happen next. What will happen is this: it will run along an artificial channel above the gas pipeline which will be firmly laid on a granite base. At present a powerful bulldozer is still painstakingly grading the bottom of the excavation area, and an excavator is shovelling out the loosened earth. Specialists from the GDR are building this 300-kilometer gas pipeline. Section chief Dieter Weber related the following: "Many of our men got experience working on the gas pipeline Urenoy-Uzhdorod." He then elaborated. "Yes, we call the line 'scar' because we are building it ourselves. All the equipment: cranes, loaders and trucks are from the GDR. The reinforced concrete slabs, the cement, reinforcing accessories and the portable houses that we live in are all made at German plants. Only the pipe do we get from Ural Metallurgists." And what about the excavation...? Together with the bounds of excavated earth and access roadways, the right of way reaches a width of 20 meters, and in spots, 50 meters. Automatically one asks how much fertile soil will this "scar" take away from our grain producers. However, the fears are in vain. Along the way to the city of Infremov, where the main base of the German workers is located, our car stopped on the edge of a green field. Our driver F. Schmid who was doubling as interpreter told us that very recently, at the beginning of April, the workers had laid pipe here. Afterward the excavated area was filled in with earth, topped off by a layer of fertile soil. At the end of the month the kulkoz sowed wheat and here it was now, almost up to our waist. There were no traces of the "scar." And this is the way it will be along the whole length of the route.

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## PIPELINE CONSTRUCTION

### BRIEFS

**PRAVDA ON EXPERIMENTAL PIPELINE--Tyumen, 12 Jun (TASS)--**Preliminary work has begun on the construction of an experimental gas pipeline consisting of multilayer pipe. The first links of this steel line that will stretch almost 300 kilometers have been assembled at welding stations in the Tyumen northland. The new line will run alongside the Urengoy-Pomary-Uzhgorod line between the Pravokhetinsky and Sosnovsky compressor stations and serve as a back-up for it. Production of the pipe which consists of several layers of coiled steel has been developed domestically. The technology makes it possible to build up the pipe walls to the necessary thickness, and the multilayered composition of the pipe permits it to withstand pressure up to 100 atmospheres. Two steel lines of such pipe are capable of replacing three lines of traditional construction. Construction workers are faced with the need to work out techniques that will allow them to assemble the multilayer pipes under difficult northern conditions. There are many impassable swamps, extensive forest covered hilly terrain and extended areas of permafrost along the route of the experimental line. Practically speaking, however, new equipment will not be needed because the pipe is of standard diameter and only slightly heavier than the conventional pipe. Already this summer more than 30 kilometers of line will be laid. Roads to the assembly areas were built during the winter and equipment delivered to them. Construction will be completed during the second quarter of next year. [Text] [Moscow PRAVDA in Russian 13 Jun 84 p 2] 8750

**GAS LINE LAID UNDER CASPIAN--Baku--**Construction and under water testing of the longest gas delivery line in the Caspian have been completed. The line connects the Bakhar Gas Field with a gas refining plant, where the largest portion of offshore gas is drilled. The line will cut in half the distance Caspian gas must travel and replace seven pipe lines that have been supplying the plant with raw material. The new line, laid 30 meters under the surface of the Caspian, was laid on the sea bottom by a specially outfitted pipe laying vessel. A unique conveyor in operation on board the vessel made it possible for pipes to be welded one after another into an unbroken line, X-ray tested and, covered with an anticorrosion insulation, dropped to the bottom. [By D. Melikov] [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 11 Jul 84 p 2] 8750

**KISHINEV-RYBNITSA PIPELINE OPERATIONAL--Kishinev--**The laying of the Kishinev-Rybnitsa pipeline has been completed. It will carry natural gas from western Siberia to the Moldavian Metallurgical Plant and other Kishinev enterprises. The line was evaluated as excellent and put into operation. [Text] [Baku VYSHEK in Russian 5 Jul 84 p 1] 8750

**EXPERIMENTAL PIPELINE FOR TWINING** Preliminary work has begun on the construction of an experimental gas pipeline consisting of multilayer pipes. The first links in this steel line, that will stretch almost 500 kilometers, have been assembled at welding stations in the Tyumen northland. The new line will run alongside the Uralsky-Tyumen-Tishulovsk line between the Prayektinskiy and Sosnovyiy compressor stations and serve as a back up for it. Production of the pipe which consists of several layers of rolled steel has been developed domestically. The technology makes it possible to build up the pipe walls to the necessary thickness, and the multilayered composition of the pipe permits it to withstand pressure up to 100 atmospheres. Two steel lines of such pipe are capable of replacing three lines of traditional construction. Construction workers are faced with the need to work out techniques that will allow them to assemble the multilayer pipes under difficult northern conditions. There are many impassable swamps, extensive forest covered hilly terrain and extensive areas of permafrost along the route of the experimental line. Already this summer more than 40 kilometers of line will be laid. Roads to the assembly areas were built during the winter and equipment delivered to them. Construction will be completed during the second quarter of next year. [By V. Zhilyakov, TASS] (Text) (Moscow) (RUSSIAN) (Sovetskoye Radio) 14 Jan 84 p 1 0750

**PIPELINE TO SEAN NEVILSKY STRAIT** (Khab, Sakhalin Oblast) - a temporary village for construction workers on the new pipeline Sakhalin-Kamchatka on the Sea of Japan has been set up at the narrowest point of the Kamchatka Strait at Cape Pribor. The line will supply the important industrial center on the Amur with raw materials and fuel. The workers are faced with the job of laying three layers of 700 mm diameter steel pipe on the bottom of the deep water strait. During the winter surveying work was done from the ice cover, and now on the beach near the village of Angren a loading area is being set up from where the winter deployment will be "jumped" next year. An industrial base is being constructed, and a winter is being prepared to accept cargo. On Sakhalin, 100 km of kilometers of the line will be already have been welded into sections. (Text) (Moscow) (RUSSIAN) (Sovetskoye Radio) 23 Jan 84 p 1 0750

**ICE-BARRIER VALLEY OF LAKES** - A large deposit of natural gas found on an island near the Arctic circle near Urengoy has presented specialists with an arduous problem: how can the gas be transported to the mainland? A winter deployment is possible, solutions have been considered. They include the construction of an under water pipe line. The pipeline, however, was rejected because of the length of the construction. Finally, an answer was given to the problem: the gas will be transported by ship. It is estimated that their fleet will reach 400 ships, and they will be able to transport up to 25,000 m<sup>3</sup> of gas per day. They will be able to transport the gas by ship along the low section that will be covered with snow, level places. The cargo will be transported in 100 m<sup>3</sup> of 2.5 m diameter, will be the first in low speeds with them, what and going southwards. (Text) (Moscow) (RUSSIAN) (Sovetskoye Radio) 16 Jan 84 p 1 0750

**MAINTAINING PIPELINE SYSTEM** The first set of welding pipes on the pipeline system of the Urengoy-Tyumen-Tishulovsk line has been welded into the line. According to the initial calculations of the line, the capacity will be 100 m<sup>3</sup> of gas per day. The first set of welding pipes will be the first in low speeds with them, what and going southwards. (Text) (Moscow) (RUSSIAN) (Sovetskoye Radio) 16 Jan 84 p 1 0750



**PARALLEL RUNNING URENGOY PIPELINE--**Testing of the main gas pipeline Urengoy-Tsenter 1 has been successfully completed. Yesterday the main section of the line was put into operation. This great labor victory was achieved almost six months sooner than planned. A little more than a year ago work collectives of the Ministry of Construction of Petroleum and Gas Industry Enterprises commenced construction of this 3,000 kilometer gas pipeline. Right from the outset all the units of the construction "conveyor" did their work efficiently and without interruption. The experience accumulated installing the Urengoy-Pomary-Shchegolovo line was a help. Well in advance of their need, the necessary supply of pipe was delivered, equipment was prepared and temporary construction villages were built along the whole route. Construction workers are being shifted to the route of the Urengoy-Tsenter 2 gas pipeline. Here, hundreds of kilometers of pipe have already been welded into the line. It has been decided to complete construction of this steel line ahead of schedule also, during this year. [By V. Zhilyakov and A. Sul'din, TASS] [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 12 Jul 84 p 1] 8750

**NETHERLAND GETS KHARTSYZSK PIPE--**The workers of the Khartsyzsk (Donetsk Oblast) Pipe Plant have become main suppliers to oil and gas pipeline builders of the north. A milestone pipe has been welded here. Plant workers have produced a half million tons of output since the beginning of the year. They have exceeded the plan for the production of front resistant large diameter pipe by 200,000 tons. [Text] [Kiev PRAVDA UKRAINY in Russian 18 Jul 84 p 1] 8750

**NEW PIPELINE BRINGS SAVINGS--**Sverdlovsk--The first section of the Sineglersk-Sverdlovsk oil pipeline stretching 243 kilometers has been put into operation five months ahead of schedule. Now fuel from refineries in "Sverdlovsk" will be supplied to the central Ural area by pipe. 400,000P will be saved yearly by reducing rail shipments. Thousands of tank cars will be freed to fill other needs of the economy. [By V. Korshik] [Text] [Moscow PRAVDA in Russian 7 Aug 84 p 4] 8750

**PIPELINE FIRST PHASE COMPLETED--**Sverdlovsk--The first phase of an oil products pipeline from Sverdlovsk to Sverdlovsk has been put into operation ahead of schedule. The Ural industrial center has received by pipeline its first gasoline. Putting this line into operation will produce yearly savings of about 500,000P due to reduced fuel shipment by rail and also will prevent the interruption of gasoline supplies to automobile enterprises. The workers of the plant (Sverdlovskkhimmetroi, Glavvostoktruboprovodstroi and Uralmetallurgmontazh Sverdlovsk Chemical Construction Enterprise, Main Eastern Pipeline Construction Enterprise and Ural Metallurgical Assembly Enterprise) made a great contribution to the start-up of the oil products pipeline ahead of schedule. [By A. Mal'nev, staff correspondent] [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 4 Aug 84 p 1] 8750

**PIPE WELDING TECHNIQUE DEVELOPED--**Vyksa, Gorkiy Oblast--Production of 377mm diameter welded pipe that will supercede the seamless variety has been implemented at the Vyksa Metallurgical Plant. For the first time in our country pipe of such diameter had been welded by a high frequency welding method, a method that is economical and advanced. The work collective of the third welding shop,

where this pipe is produced, has fulfilled with distinction its obligations to master this work. The plan assignment was surpassed during the very first shifts. More than 300,000 tons of the new pipe have been shipped to oil industry workers in Tyumen. [By S. Sidorov, correspondent for the Vyksa Rabochiy] [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 3 Aug 84 p 2] 8750

URENGOY-TSENTR-1 TEST SUCCESSFUL--The last section of the gas pipeline Urengoy-Tsenttr-1 has been successfully tested. The line stretches for 3,020 kilometers, crossing over marshland and permafrost, forests and fields, rivers and mountain slopes. Tens of line units of Minneftegazstroy [Ministry of Construction of Petroleum and Gas Industry] based on the route were striving for the goal day after day and in all kinds of weather. And finally the last section of the pipeline has been built across the Ural. The new fuel line constructed to transport Siberian gas to the central regions of the country has been completed six months ahead of schedule. This is the fifth Urengoy pipeline to have been built since the beginning of the five year plan. As is generally known, six pipelines for Urengoy are to be built during this five year plan. The sixth, Urengoy-Tsenttr-2, will duplicate the fifth, running alongside of it in the same "corridor." How is the work coming along? Today, already 1,250 kilometers of pipe have been welded into the line, 900 kilometers of which have been insulated and laid underground. On average workers lay 10 kilometers of pipeline a day. [By A. Avdeyev] [Text] [Moscow PRAVDA in Russian 1 Jul 84 p 1] 8750

CSO: 1822/414

## COMPRESSOR STATIONS

### USE OF RECLAIMED HEAT FOR GREENHOUSES DISCUSSED

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 14 Aug 84 p 2

[Unattributed article, "The Hot Pipeline Route", under the rubric "The newspaper has been issued. What has been done?"]

[Text] In an article under the above title, published in the 23 May issue of SOTSIALISTICHESKAYA INDUSTRIYA, V. Virichev wrote about the inadequate utilization of "waste" heat during operation of an Ukhtatransgaz Association pipeline. V. Protasov, director of the Mingazprom [Ministry of the Gas Industry] Raspredgaz [Gas Distribution] Administration, agreed with the criticism.

He reported that industry associations, enterprises and organizations are presently taking measures within the industry to increase the usage of secondary heat and power resources. Installation of waste heat salvagers is now planned for all newly planned compressor stations powered by gas turbines.

According to a recent ministry order, a directive was issued to the main territorial administrations and the all-union industrial and production associations to examine, before 1 October of this year, the possibility of changing household heating over to heating with recovered heat, and planning institutes have been directed, by order of the associations, to provide a plan for heat-supply systems.

The Ukhtatransgaz Association is expanding its network of greenhouses located near compressor stations: beside the Ukhtinskaya, greenhouses will show up near the Mikunskaya and the Sindorskaya stations this year. Greenhouses and hothouse-vegetable combines are being built near the Privodinskaya, Urdomskaya and the Yubileynaya compressor stations. They will be operable within the next two years. However, this heat demand is seasonal. It is for this reason that Mingazprom, together with USSR Minenergo [Ministry of Power and Electrification] has begun work on the recovery of the heat from gas turbine installations for use in steam turbines. This will permit an increase of the KPD [efficiency] of up to 38 percent for these units and will save one quarter of the fuel required.

The gas workers could fully provide related industries with secondary heat, which would allow them to do away with their boiler houses. However, consid-

eration of this question in the administration of the northern main oil pipelines is being delayed by Minnefteprom [Ministry of the Petroleum Industry] Glavtransneft' [Main Petroleum Transport and Supply Administration], at the RSFSR Minrechflot [Ministry of the River Fleet] Kotlas Repair and Operation Facility, and also in Minplodoovoshchkhov [Ministry of the Fruit and Vegetable Industry] and Mincel'khov [Ministry of Agriculture] unions.

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## COMPRESSOR STATIONS

### CONSTRUCTION, OPERATION OF NEW GAS-FILLING STATION

THE PRAVDA UKRAINY is publishing a series of articles on the construction and operation of new gas-filling stations.

[Article by N. Baras', PRAVDA UKRAINY correspondent: "Not Counting the 'Minor Details' ", under the rubric, "He Who Keeps Down the Work Rate"]

[Text] On the outskirts of Nemirov, within 45 kilometers of Vinnitsa, the structures of a new gas-filling station are being erected. The facility, the estimated cost of which is around three million rubles, should go into operation by the end of the five-year plan period, and provide processing for 30 thousand tons of condensed gas per year.

For the general contractor-Mobile Mechanized Column No 49 of the Vinnitsk-sel'stroy [Vinnitsa Rural Construction] Trust, which has been carrying out construction operation here since mid-1982, in the words of its supervisor, M. Ya. Dekhtyaryuk, the gas-filling station is "a real windfall". And here's why. In the last few years, PMK-49 [mobile mechanized column] has not distinguished itself with production successes, and has gotten into debt to the state to the tune of not just a single one hundred thousand ruble sum. And suddenly the opportunity to make things right has presented itself.

"Why not? Things are going pretty well for the general contractor today," noted B. M. Goloven'ko, customer representative and senior engineer for the Vinnitsgaz Association, "if, of course, you don't count one or two minor details. But the main thing is that the project is under construction."

We note here, that the general contractor has accomplished quite a bit in a relatively short time. At the construction site, which sprawls over tens of hectares, the structures of the boiler room, the garage, and a bloc of spare accommodations have already arisen, and the gas-filling shop, the transformer substation and the condensed gas storage facility are being erected. Since construction began, about 800 thousand rubles have been mobilized as a whole.

"Construction rates for the station are fairly high," says G. Ye. Panchuk, PMK-49 construction superintendent. And this is thanks mainly to the skillful organization of operations on a cost accounting basis, the well-thought-out



arrangement of personnel in the construction area and efficient use of equipment. And the fact that the construction project includes some 35 large and small facilities should be taken into consideration. Of course, the rates could be even higher, but unfortunately, various "braking factors" cannot be omitted.

The general contractor ran across the first of these factors when construction first began. SPMK-526 [specialized mobile mechanized column], of the Vinnitskisel'stroy Trust, having prolonged the ground preparation operations, failed to have the site ready in time for construction. As a result, out of the 300 thousand rubles allocated for the year, PMK-49 used up a little more than half, having started out, in this way, from a position of debt.

At the same time, another subcontracting organization, SPMK-525, from Khmel'nitskiy, showed outright disrespect to the general contractor, and indifference to this important construction project. The specialized column was to have provided a water-supply facility. The plan specifically called for the drilling of two wells at a depth of 100 meters, for the wells to be tested and turned over to the builders. The cost for these operations was estimated at R22 thousand. The workers from Khmel'nitskiy succeeded in completing only a third part of these facilities. Only one well was drilled, and that to a depth of only 60 meters, no tests were carried out, and then, blaming the delay on a lack of needed pipe and on the complicated soil structure, they simply stopped work, leaving the construction project with no water. Over two years have gone by since then, and the SPMK-525 specialists, having abrogated their stipulated obligations, haven't even shown up at the project.

"It is especially difficult in summer, when the basic construction and installation operations are being carried out," says Grigoriy Yemel'yanovich (Panchuk). Right now there's a student brigade working with our people. We've even set up an additional concrete junction, in order to provide everyone with a work front. And water has to be supplied in tanks."

Nevertheless, in the face of such considerable "braking factors", the construction workers decided to meet the customer halfway, and took it upon themselves to complete a number of facilities at the gas-filling station (in particular the transformer substation, the boiler house and a block of auxiliary accommodations) ahead of schedule, i.e., this year. Of course they understood that this would also require additional efforts from the subcontracting organizations. But here again there was a conflict of interests. If SPMK-513, which is laying out the power network, has treated the customers' wishes with understanding, and has already completed over 20 thousand rubles' worth of basic work, the other subcontracting organizations, just like previously, are in no hurry. Moreover, PMK-4, which is involved in laying heat and sanitary engineering lines inside the buildings not only has made no attempt to speed up their work, they have suspended their operation. They have, since construction began, assimilated a total of 7000 rubles out of 46 thousand. Of course, this also delays those operations which the builders had intended to continue after the inside piping was installed.

SU-26 [Construction Administration], of the Podol'skprommontazh [Podolsk Industrial Installation] Trust has also done a disservice to this construction project. The costs incurred by this organization to complete a condensed gas storage facility are minor--5.6 thousand rubles in all. But the construction-installation contractor has turned this protracted delay into an underfulfillment of 60 thousand rubles. True, the builders are counting on making up this lag by the end of the year anyway, and meeting planned goals, but the hope of turning a number of the facilities over ahead of schedule is out of the question.

In this regard, I would like to turn my attention here to a certain peculiarity, i.e., the general contractor, the majority of construction materials suppliers and a number of subcontracting organizations are all subordinate to one master, UkSSR Minsel'stroy. It would seem that there are no interdepartmental barriers here. But that's exactly what we've come up against during the course of this project.

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## COMPRESSOR STATIONS

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**WESTERNMOST COMPRESSOR STATION COMPLETED**—(MOSCOW (TASS) 20 June)—Construction of the westernmost compressor station on the Urengoy-Tomary-Uzghorod gas pipeline has been completed in the Trans-Uralian settlement of Volovets. Guest-workers from the GDR, having completed their assignment ahead of schedule, today presented the operating personnel with a symbolic key to the station. At a meeting called in honor of this occasion it was noted that, thanks to the selfless labor of the Soviet people and the fraternal aid of the countries working in socialist cooperation, the USA was unsuccessful in hindering construction of the transcontinental gas main. The consumers in Western Europe received their gas from Urengoy on time. The GDR guest-workers are also erecting a number of ancillary facilities in Volovets. They have already turned over two 144-apartment residences and a secondary school. And next in turn are a children's training center, a hospital-polyclinic, a department store and a regional boiler house which will operate on Siberian gas. These facilities will be working autographs, in Soviet land, of the friendship of guest-workers from a fraternal country. (Moscow (Krasnaya Gazeta) in Russian 1 Jul 84 p. 3) 17589

**ILINETSKIY COMPRESSOR STATION COMPLETED**—(MOSCOW)—Construction of the Ilinetskiy compressor station on the Urengoy-Tomary-Uzghorod gas pipeline has been completed. The state commission accepted the station's start-up facilities into operation with a good rating. The large and complicated volume of work on this facility was completed in short order by the Vinnitsk-promstroy [Vinnitsa Industrial Construction Subdivision Combine], the Podolsk-prommontazh [Podolsk Industrial Installation Trust] and other construction organizations. Here again, working competence and the close cooperation between allied industries showed displayed their advantages (in construction of the station, in addition to the general contractor, 18 specialized subcontracting organizations took part), and technical innovations and new methods of the organization of labor and construction administration were introduced. For example, the machine operators skillfully used the pipe-laying equipment, rather than winches, to install the compressors, which with the work on each set of units was completed in three days instead of the two weeks allotted for this operation. Other efficient methods and technical tricks were also used. All this made possible the fullest use of labor and increased labor productivity while fulfilling production assignments. Thus, for instance, two months passed to prepare the first compressor for operational readiness, then the second took a month and a half, and the third took 22 days in all. Thus, time

On 30th October the piles, driven into the compressor station's foundation by May 11 last year, until the station was turned over to the acceptance commission, a period of 13 months passed. The underground link-up of the Ilinchik compressor station's pumping units with the main pipelines has already been made. The gas-cleaning and gas-cooling units, the operator (operator-hall) and a number of auxiliary structures are ready for operation. The construction workers are completing the socio-cultural-domestic facilities, are settling the area around the station and the residential city for the operators by good order. [BARKAZIYA GAZETA correspondent] [Text] [Kiev RABOCHAYA GAZETA]

NEVINNOMYSSK COMPRESSOR STATION OPERATING--Nevinnomyssk (Stavropol Kray)--Construction and installation workers have put, of those operating, the Nevinnomyssk gas compressor station, which is on the Novopskov-Aksay-Mozdok main gas line, into operation. Nevinnomyssk Administration brigades of the Ministry of Installation and Special Construction (Minskuchstroystroy's [Ministry of Installation and Special Construction] Trust used special compressor installation for the station's equipment units and pipelines in order to speed up their operations. "They consolidated their operations assembly areas which were specially organized at our production plant," explains administration director V. Stepanenko. "There, in conditions appropriate those of a factory, they carried out assembly and adjustment, tests of the units, and then sent them, completely ready, to the construction site. And there, led by construction superintendent A. Stepanov, the brigades of the experienced installation workers A. Dedyun, V. Ivanov, and I. Semenov, quickly set the units into position. [By L. Aleynik] [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 14 Jul 84]

NEVINNOMYSSK COMPRESSOR STATION OPERATING--Nevinnomyssk (Stavropol Kray)--Construction and installation workers have put the Nevinnomyssk gas compressor station, on the Novopskov-Aksay-Mozdok main gas pipeline, into operation. At present those already in operation. [By L. Aleynik] [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 14 Jul 84]

INDUSTRIAL GROUPS CITED--(TASS)--Gas compressor motors, manufactured by the Machinebuilding Association imeni M. V. Frunze, are operating on the Novopskov-Aksay-Mozdok, Central Asia-Center, and Frunze-Alma-Ata gas pipeline. According to this year's schedule for deliveries, tens of these motors are still to be produced. The majority of them will be pumping gas to the western regions of the country and to the Urals. [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 14 Jul 84]

NEVINNOMYSSK COMPRESSOR STATION OPERATING--UkSSR (TASS)--The last unit of the Nevinnomyssk compressor station, built by workers from the GDR, was recently put into operation. From here, gas is pumped across the Carpathian pipeline. Many important problems regarding operation of the western section of the Novopskov-Aksay-Mozdok gas pipeline have been solved: planned deliveries have been successfully accomplished, summertime productivity of the pipeline has increased by 1.5-fold and injection of gas into natural storehouses (i.e., underground storage, has been increased. The Carpathian workers

are completing the major operation which is being carried out all along the ultra-long-range pipeline, they are, in this fashion, implementing gas delivery abroad. [Text] [Moscow SEL'SKAYA GAZETA in Russian No. 9, p. 1, 1965]

**TORBEEVSKIY COMPRESSOR STATION OPERATING**--The Torbeyevskiy compressor station in the Mordovian ASSR is at work transporting gas. Its complex, first of all, is providing the planned pressure, and the necessary temperature and cleanliness for the transportable raw material along the Urengoy-Pomary-Uzhgorod pipeline, this section of which stretches for hundreds of kilometers. [Text] [Moscow EKONOMICHESKAYA GAZETA in Russian No. 31, Vol. 8, p. 1, 1965]

**ZAVOLZHSKAYA COMPRESSOR STATION OPERATING**--Krasnoarmeyskoe (Chuvash ASSR)--The Zavolzhskaya gas compressor station, located on the Chuvash section of the Urengoy-Pomary-Uzhgorod main, is operating at its planned capacity. The third and last unit went into operation here today. The smooth operation of the gas-pumping units, the capacity of which is 25 megawatts each, is made possible by the close cooperation of the Volga workers with the machine builders of the Nevsky Plant in Leningrad, where the units were manufactured, and due to the expertise of the builders and installers of the "working cooperation" associations. [Text] [Baku VYSHEK in Russian No. 11, Vol. 4, p. 1, 1965]

**KARA-KALPAK COMPRESSOR STATIONS OPERATING**--Bukhara (Kara-Kalpak ASSR)--The Turey and Karakalpakkiya compressor stations, located on the Central Asia-Center and the Bukhara-Ural main gas pipeline routes are operating at 1.5-fold greater capacity than previous ones. Construction Trust Collective No. 169 is building them at accelerated rates at Ustyurt. [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian No. 49, Vol. 9, p. 1, 1965]

**STATION OPERATING AT PLANNED CAPACITY**--The Zavolzhskaya gas compressor station, located on the Chuvash section of the Urengoy-Pomary-Uzhgorod main, is operating at planned capacity. The third and last unit went into operation here today. [Text] [Moscow EKONOMICHESKAYA GAZETA in Russian No. 31, Vol. 8, p. 1, 1965]

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GENERAL.

## ROMANIA COOPERATES IN POWER ENGINEERING

Moscow SOVETSKAYA ROSSIYA in Russian 23 Aug 84 p 3

[Article by V. Klimenko, TASS correspondent for SOVETSKAYA ROSSIYA: "Victory Flags"]

[Text] Bucharest -- Not too long ago the place where the enormous buildings of the Bucharest Heavy Machine Building Combine have been erected there was overgrown vacant land. But now in an area of about 170 hectares a whole city has sprung up, employing more than 12,000 workers, engineers and technicians.

Today national banners and red calico streamers are proudly waving over the combine, and its best representatives are marching in a holiday parade. The plant's workers greet the 40th anniversary of the liberation from fascism in a cheerful mood. Their plant is making a substantial contribution to the development of virtually all the leading branches of industry. Its products are turbines for the power industry, including nuclear power, mechanized lines for the cement industry, mechanical and hydraulic presses, equipment for drilling deep wells, heavy shipboard machinery, heavy-duty pumps.

"It is very important that our combine is today producing high-quality heavy machinery," I was told by A. Nestase, secretary of the plant's party committee. "Previously Romania was forced to buy it abroad. And now we are shipping our output to 98 countries, including the USSR, Poland, Bulgaria and Yugoslavia."

We go into the machine shop, which is really most impressive in its size and up-to-date equipment. All operations here are performed by efficient machines, many with programmed control. The logos of Soviet plants are in several of them.

"The combine," my informant went on, "maintains reciprocally advantageous contacts with our Soviet partners. We ship to the USSR equipment for

gas pipeline construction, presses with a force of 6,000 tons, rods for drilling at a depth of 10,000 m, and a number of other types of products. A contract has been drawn up for the delivery of equipment for Uralmash and Avtostal'. The Soviet Union in turn has granted us licenses to manufacture several types of presses, and is helping to start the production of equipment for nuclear power plants."

"We are taking an active part in the activities of the Interatomenergo international organization of the CEMA member countries, and we are cooperating with the socialist countries in the construction of AES," continued Nestase." The plant produces, in particular, parts for steam turbines, heat exchange pumps and a number of other important components. Within the framework of the cooperation between the Soviet organization Atomenergoeksport and the Romanian Rom-energo we have obtained from the Soviet Union design documentation and licenses to construct reactors with a capacity of 440 and 110 MW. Our collective is making a contribution to the construction of the Yuzhno-Ukrainskaya AES in the USSR. I should mention that our country, as a general contractor and designer of the socialist countries' Interatomenergo organization, at one time presented the necessary documentation to set up a major plant within the combine to produce equipment for the nuclear power industry.

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## GENERAL

### PROBLEMS, RESEARCH ON STEAM, WATER DISCUSSED

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 6 Sep 84 p 2

[Interview with Mikhail Adol'fovich Styrikovich, member of the presidium of the USSR AN /Academy of Sciences/ and academician by SOTSIALISTICHESKAYA INDUSTRIYA correspondent, N. Zaporozhets: "The Power Industry: Steps into the Future"; date and place not specified]

[Text] The outlook for the development of the power industry was at the center of interest of the scientists and experts of many countries gathered in Moscow for the 10th Conference of the International Association on the Properties of Steam (MASVP). The conference took up a broad range of problems related to the design and operation of power plants and to improving their reliability and efficiency. Here is what M. Styrikovich, member of the presidium of the AN USSR and academician, has to say about this:

[Statement by M. Styrikovich] Almost 80 percent of the electric power generated in our country derives from steam-turbine power plants operating either on organic or on nuclear fuel.

It would seem that the properties of steam were long since well known. In actuality, however, the construction and operation of power plants often comes up against new problems. And how could it be otherwise! In the 1920s, when the first large-scale steam-turbine facilities came into being, the operating steam pressure in them was 30-35 atmospheres and the temperatures, up to 400°. But today these parameters have reached 240-300 atmospheres and 550-600°. And there is a need to raise them even higher in order to improve the efficiency and reliability of the facilities.

All this has required the carrying out of basic thermodynamic research, which has been a difficult, labor-intensive and costly affair. The idea therefore arose of uniting the efforts of the industrially developed

countries to work out sound recommendations on the exploitation of the properties of steam. This idea has been embodied in the holding of international conferences. And to coordinate research there has been established the International Association on the Properties of Steam, with the participation of the USSR, the United States, Great Britain, Canada, France, West Germany, Czechoslovakia and Japan.

[Question] Which of the problems raised in the nearly 100 reports would you single out as the most urgent?

[Answer] One of these problems is related to the widespread adoption of computers and automation in the design and control of power facilities. For example, hundreds of thousands of parameters are employed in the calculations for the major power unit of a nuclear power plant, of which 80-90 percent relate to the properties of steam. Right up to recent time, moreover, these calculations were performed on the base of tables for water and steam that had been worked out and updated under MASVP direction. The tabular data were not suitable for inputting into computers, however, and had to be converted into special equations. Work along this line is now going on actively. And several of its results were extracted for the consideration of the conference participants.

No less a problem is the fact that in actuality the concern is always not with pure water but with water solutions. Even though the impurities it contains are at extremely low concentrations, they have a considerable impact on the operation of the heavy-duty power units of thermal and nuclear power plants. Under conditions of high pressures and temperatures steam interacts with structural materials, and the products formed thereby are dissolved in the carrier and then deposited on equipment parts. All this compels us to continually upgrade the requirement for pure water: Even slight accumulations on the blades of a turbine markedly lower its efficiency and output.

[Question] What is the significance for our power industry, Mikhail Adol'fovich, of the problems discussed at the conference?

[Answer] As you know, the USSR Energy Program provides for an outpacing development of nuclear energy for the generation of both electric power and thermal energy, and the implementation of a vigorous energy-conservation policy. In this connection, the problems of ensuring the trouble-free operation of nuclear power plants and improving the reliability of their component parts take on special importance. The main causes of downtime are generally related to breakdowns in the operation of steam equipment. And the main offenders in breakdowns are various types of electrochemical corrosion of metal.

Operating conditions for power plants running on organic fuel have also gotten considerably more difficult. Especially for power units that often switch from normal operation to semi-peak or peak operation. The frequent shutdowns and startups lead to a risk of damage to the major components of power facilities from the repeated and substantial thermal tensions produced in them. The probability of this sharply increases for components operating in a corrosively active environment. To improve the operating reliability of power units it is therefore necessary to observe water discipline, and for that, to know the properties of the solutions. And finally, research in this area is of great importance for constructing geothermal power plants and distilling facilities.

[Question] How would you evaluate the results of cooperation of the scientists and experts of various countries in the study of the properties of water and steam?

[Answer] The goal of joint efforts was from the very beginning not just the exchange of information and the results of research, but the development of internationally agree-on standard materials that could be utilized in rating power equipment. For this it is necessary to conduct repeated independent measurements, to recheck the information obtained, and to improve methods of research. Especially now, when ever greater demands are being made on the properties of water and steam. This 10th MASVP Conference has undoubtedly made a great contribution to the storehouse of knowledge about them and to their specific utilization in the power industry.

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## GENERAL

### WASTE DISPOSAL, ENVIRONMENT AT GASFIELDS REVIEWED

Ashkhabad TURKMENSKAYA ISKRA in Russian 21 Aug 84 p 4

[Article by S. Batyrov, director of the Turkmen Branch of VNIIGaz /All-Union Scientific Research Institute of Natural Gas/, and A. Bayramov, chief of the environmental protection group of the Turkmen Branch of VNIIGaz, under the rubric "Problems and Answers": "A Task of Great Importance"]

[Text] The gas industry has developed successfully in Turkmenistan. But we will not be talking today just about industrial processes. The issue is, while developing this sector, to keep the environment clean.

At the beginning of last year the USSR Mingazprom /Ministry of the Gas Industry/ worked out a number of specific measures aimed at further strengthening nature-conservation work in the country's gas enterprises. They apply, of course, to our republic. In amount of gas production Turkmenistan holds one of the leading places in the country. In the plan for the sector's development, new fields are continually being developed and put into production. By the start of the 12th Five-Year Plan there will be about 20 of them -- gas and gas-condensate.

It is well known that the operation of fields is accompanied by the accumulation of industrial waste waters. These are mainly by-product, production and formation waters that result from on-field procedures of processing gas for transport. As a rule the effluents have a high content of dissolved salts, they contain oil products, and in a number of cases are contaminated with toxic substances. The disposal of oilfield waste has become a sheer necessity.

There are several methods of disposal on a commercial scale. The most promising is to inject the water into deep absorption strata. The application of this method to oil and gas fields is facilitated by the fact that at the stage of drilling exploratory and prospecting wells, when the geological profile is being studied, and at the start of the development

of a field it is possible to identify a site for injection in the depths of the earth. The effectiveness of this method is increased by the fact that the stock of deep wells drilled earlier and not exploited for geological or technical reasons is utilized for injecting waste water into a formation. The costs of this type of operation are therefore not great.

There are also recommendations as to how this should be done. They have been developed by the Turkmen Branch of VNIlgaz and the Saratov Leading Institute of VNIlgaz and have already been adopted at the Zapadnyy Shatlyk, Vostochnyy Shatlyk, Achak and Kirpichli fields. This work will soon be extended to the Gugurtli and Severnyy Balkui fields. A nature-conservation facility has been put into operation at the Dovletabad fields, and treatment facilities are under construction at Sovetabad.

There are positive achievements. However, there are also problems. One of them is the failure to apply the means allotted for these purposes at the proper time and in full measure.

And there are even difficulties with this procedure. For example, the complex process of disposing of oilfield wastes by injecting them into absorption strata has been halted in southeastern Turkmenistan (Shorkel', Mollaker, Tedzhen and elsewhere). The fact is that the TuSSR Administration of Geology has put a ban on the injection of oilfield wastes into aquifers of the Bukhara stratum that date from paleological times because of the usefulness of these waters for therapeutic bathing purposes. On the other hand, the predominantly clayey nature of the known geological profile of the wells in these fields makes it difficult to select other sites for the injection of oilfield wastes. We must find a way out. The Turkmen Branch of VNIlgaz has now joined forces with the Solntse NPO /scientific production association/ of the TuSSR AN /Academy of Sciences/ to develop the necessary technology for oilfield waste disposal.

Treatment facilities have a very important function in the accomplishment of nature-conservation tasks. It is well known that with the aid of these facilities one can successfully prevent nonproduction losses of gas concentrate during the process of separating it from the water in oilfield wastes. Also important is the quality of processing them for disposal, especially in fields containing hydrogen sulfide, such as Gugurtli, Severnyy Balkui and Saman-Tepe. This is important because it is totally unacceptable to inject the hydrogen sulfide dissolved in oilfield wastes into absorption strata, and equally unacceptable to discharge it into open bodies of water or evaporation ponds. Hydrogen sulfide released into the atmosphere is a danger to human health. Extremely strict control must therefore be set up so that discharges of hydrogen-sulfide-containing gas into the atmosphere do not exceed the

established norms. This is both a reminder and a warning. Initial development of gas deposits containing hydrogen sulfide was set for the end of 1983 with the development of the 15th stratum at Gugurtli. But in the future other identical major strata will also be put into service.

And there is still another important nature-conservation measure applicable to the gas fields of Turkmenistan. Since the overwhelming majority of the fields are located in the desert, measures are needed to protect nature from undesirable disruption by man. The experience of designing, building and operating gas fields and distribution networks has shown that all these stages must be preceded by special geographical and engineer-exploratory scientific research. Considering the urgency and the practical advisability of this research, the Institute of Deserts of the TuSSR AN, has for a number of years been developing special recommendations though the technical programs of its design organizations. Scientific experts on deserts have provided much assistance in developing recommendations to protect gasfield facilities and distribution pipelines -- the installations of the Turkmengazprom VPO /expansion unknown/ -- against sand drifts and wind erosion. Recommendations already exist for the fields in Achak, Naip, Kirpichli, Beurdenik, Zaunguz'ye, Uchadzhi, Chartak, Malay and the lower Karakum. Research is being done on Sovetabad and Bagadzhi.

However, the results of investigation have shown that the recommendations of the scientists are not always carried out accurately and on time. This entails inefficient manual and mechanical work to clear sand drifts from production sites and residential areas. The residential area at the Sovetabad field is far from the best example in this regard. In a strip 50-100 m from the residential area truck wheel and tractor treads have inflicted a great deal of damage on the desert's natural vegetative cover. The sand has piled up as a result of wind action, and causes much inconvenience to the people.

And there is still one more important point. There are many types of nature-conservation work applicable to gas fields. But in carrying out the important task of protecting nature and the environment, one cannot approach the planning, development and implementation of nature conservation measures by evading an integrated approach to them. One must, of course, take account of specific features of the industry and the geographical location of facilities that can produce changes in the environment and in the depths of the earth. Integration is coordinated action by enterprises and organizations and of their managers and labor collectives. Only this kind of approach can yield the desired results.

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## GENERAL

### OILFIELD ACCIDENTS, PUNISHMENTS REPORTED

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 21 Aug 84 p 2

[Article by I. Vikhin, correspondent of the oblast newspaper ZVEZDA, under the rubric "Epilogue to a Sentence": "They Had Long Intended..."]

[Text] Perm Oblast -- I remember how there was a sudden pause during the court proceedings. Then the defense began to present the members of the court with the accuseds' personnel records, certificates and awards for achieving high production indicators.

They were on trial for negligence. For carelessness and lack of conscientiousness in the performance of their official duties.

...One winter night an accident occurred at the Chernushinskoye NGDU /Oil and Gas Production Administration/ oil processing and pumping facility in Kuyedinskiy Rayon. About 1,800 tons of so-called formation water, which is saline and harmful to vegetation and bodies of water, and 200 tons of oil ran out of a huge tank, the bottom of which had been eaten through by corrosion.

A great part of the oil was recovered, but tens of tons of it together with the saline water got into the surrounding fields and into streams and rivers.

How could such a thing have happened? Surely there was strict control over the condition of equipment -- an essential precaution in any oil-field. They also had a special emergency pit at this installation of the Gozhano-Shagirtsk field in case of an unforeseen need to capture escaping oil. And finally, it seems that the ill-fated tank was enclosed on all sides by a wall of earth.

In short, the surrounding fields and rivers were apparently well protected. And there were plenty of people looking after all this.

At this one installation, where the accident occurred, there were four executives with direct personal responsibility for the safety of the field: A. Moroshkin, chief of the installation; Yu. Chirkov, department chief and his deputy, A. Burtsov; and G. Afonin, chief mechanic of the Chernushkanef't Administration.

All four were in the dock. Corrosion had eaten out the bottom of the tank, but for three years no one had noticed that. The emergency pit turned out to be less than designed and thus could not hold all the oil. The earthen wall likewise failed to contain the oil, since it did not have special shutoff equipment.

Not one of the safety measures at this field worked. The seemingly impressive bastion erected to protect the natural environment collapsed in a single night.

Several investigating commissions had been at the site. And every one of them inevitably mentioned shortcomings in safety measures. Back in July 1981 fire-inspection personnel ordered the immediate installation of the missing shutoff device, and at the same time ordered the elimination of other violations of the regulations for oilfield operation. However, even this categorical order was ignored.

By all appearances, the departmental managers regarded requirements on safety and care for the environment simply as a formality, the implementation of which could be pushed into the background without any risk to themselves. And more than once they were pushed into the background.

When employees of Gospozhnadzor /State Fire Inspection/, after exhausting other steps, prohibited the use of several tanks, including the one where the accident later occurred, the chief of the installation, Moroshkin, simply ripped off the lead seals. And not one of the departmental managers set him straight. Their explanation was that the field could not be permitted to shut down, and since oil production plans had been well managed, they had become outstanding workers and received awards, and considered themselves winners who could not be brought to trial.

In May of this year, when the investigation was finished, and a date named for the trial, another accident occurred in the rayon. In this case a pipeline ruptured. And once again there is an item that makes you wonder: They had intended to replace the section of pipeline where the break occurred, since it had worn out long ago. It would seem that in this case also intentions had gone on too long.

Right after the trial I visited with Ye. Belyaev, chief public health



of Perm Oblast, and V. Zaytsev, senior state basin inspector. I learned that several accidents had occurred this year at a number of Permneft' oilfield associations. The reasons are always the same -- "negligence of association employees and carelessness in performing drilling operations and in repairing and operating equipment."

The Kuyedinskiy People's Court gave Moroshkin, Chirkov, Burtsev and Afonin various degrees of punishment, from fines to corrective labor at the work place. Moreover, in partial restitution for the damage inflicted on the state, they were penalized a total of 6,000 rubles.

The day after the sentence was passed I was once again in the neighborhood of the village of Kipchak where work was in progress to clear up the latest accident.

You could see trees on the banks of the quiet little river. They were black with oil. And I automatically thought of the final statement of one of the accused. Addressing the members of the court, he asked them to take into account that he was the father of two children.

It seems to me that it makes sense not just for the accused to remember this. We must all think of our children. Of how we will leave them this earth on which we live.

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## BRIEFS

REFINERY INSTALLATION--The complicated operation of installing a fractionating column at the Novo-Bakinskiy Oil Refinery imeni Vladimir Il'ich has been completed by specialists of the 1st Bakinskiy Repair Administration of the Azneftekhimmontazh /Azerbaijan Petrochemical Installation/ Trust. The column, weighing 350 tons, will be a part of a unit to obtain electrode coke, startup of which is slated for the end of the five-year plan. "For the first time in Azerbaijan a column of this weight has been assembled on the ground and installed on its foundation as a unit," the AZERINFORM correspondent was informed by El'man Ismaylov, chief engineer of the administration. "This has made it possible to shorten installation time by two weeks and to do the work without helicopters, by using only two 300-ton cranes, which are part of the installers' inventory." During the present year similar methods will be used to install four multiton coking chambers at the installation under construction. [By V. Korsh] [Excerpts] [Baku VYSHKA in Russian 31 May 84 p 1] 12697

GAS INSTALLED--Collective SMU-4 /Construction and Maintenance Administration/ of the Azgazstroy /Azerbaijan Gas Construction/ Trust has completed the installation of gas in eight populated places in Dzhaililabskiy Rayon. The inhabitants of the villages of Allar, Privol'noye, Novogolovka and Alikasumly are already using the "blue fuel". The overall length of the gas pipeline is 363 km. Construction foreman F. Orudzhev stated that since the beginning of the year the SMU collective has completed work valued at 410,000 rubles, and completed its seven-month assignment ahead of time. Gas is now being installed in houses in the village of Pokrov, and in the near future gas will also arrive at the houses of the inhabitants of the villages of Gasyly, Gadzhiismailly and Sendbazar. [By G. Amirov] [Text] Baku VYSHKA in Russian 5 Aug 84 p 1] 12697

REFINERY EQUIPMENT--For nearly a year startup has been drawing near of the first phase of large-scale production at the Pavlodarskiy Oil Refinery. Four fully assembled two-ton coking chambers to process the

wastes from petroleum fractionation. The drivers of the All-Union Spets-avtotransport Association carried out a unique transportation operation, during which pods as tall as a 20-story building transitted rivers, seas and land. Taking over from them, the construction workers have now literally started the installation work at a run. "It will now take only a few months to install the components at the work places and to obtain the first production," said A. Belousov, director of the refinery. "That will made it possible to shorten construction time and to achieve high operating characteristics in the complex equipment assembled under plant conditions." The itinerary and methods of transporting the chambers to Kazakhstan were chose by experts of design institutes in Moscow, Kiev and Odessa. From the Volgograd Neftmash Plant imeni Petrov the route lay along the northern seas, the Ob' and the Irtysh. Delivery to the Pavlodar river port took nearly a year. During that time the construction workers completed all the preparatory work and installed the pipelines. [Text] Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 1 Aug 84 p 1] 12697

EVALUATING RESEARCH--In the articles "A Scientific Matreshka" and "Judge by Results" (SOTSIALISTICHESKAYA INDUSTRIYA dated 13 March and 23 June of this year), which were published on the pages "People's Control", the issue was the practice of evaluating the activities of scientific institutions. The opinions of the writers widely diverged, although both of them (and V. Yershov, chairman of the Krasnooktyabrskiy Rayon Committee of People's Control in Volgograd, and A. Khurshudov, a section chief in the SevKavNIPIneft' /North Caucasian Scientific Research Institute of Oil/ came out vigorously for rational utilization of resources allotted for scientific research. V. Yershov, the representative of the people's control agencies, stated that deliberate overestimate of the planning and budgetary costs of research translates into excessive consumption of resources and violation of official discipline. The writer of the second article, A. Khurshudov, no less convinced by examples in his own work, has argued how complete an evaluation of scientific work is when based only on the amount of "assimilated" rubles. The editorial office has received a reply from the Ministry of the Petroleum Industry. V. Igrevskiy, first deputy of the ministry, has stated that the paper "correctly presented the issue of the need to evaluate the implementation of a plan for scientific research by its end results, and with due regard for the timeliness and the quality of performance." At the present time within the Ministry of the Petroleum Industry organizations are being converted to a system of compensation for work fully completed and accepted by the customer, and of financing losses through credit. [Text] Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 19 Aug 84 p 2] 12697

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